

The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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Sturgeon's High-Speed Air Compressor.

Although it is a fact generally accepted by constructors of steam engines, that economy and efficiency are well served by high pressures and quick speeds, it will be found that designers of air compressors still adhere to long strokes and slow speeds, not often going beyond a piston speed of 150 feet per minute. The difficulty encountered in the realization of the advantages offered by following the example of steam engine builders, has been the fitful and irregular action of inlet valves, generally operated by the vacuum produced by the receding piston some time after the stroke has begun. High speeds, it would seem, are impossible unless the operation of the inlet valves is independent of vacuum. A second cause of difficulty has been the generation of heat by the friction of the air passing through delivery passages inadequate in section, independent of that due to compression, which, of course, must remain constant for any degree of compression. To insure steadiness the moving parts must, of course, be carefully balanced. The points of which we have just spoken have been specially kept in view in designing Sturgeon's high-speed compressor, which is built by the well-known Philadelphia firm, I. P. Morris Company, Port Richmond Iron Works. In the accompanying illustrations, Fig. 1 shows a side elevation, and Fig. 2 a plan, of an air compressor, with steam and air cylinders 10½ inches in diameter and 12-inch stroke. The air cylinder *a* is attached to one side of the hollow bed, or receiver *b*, and is worked by means of the steam engine *c*, bolted to the other side of the same bed or receiver, through the crank shaft *d*, carrying a fly-wheel, *e*, at each end. To these fly-wheels the crank pins *f* are attached at right angles to each other, so that the piston of the steam engine (driving) may be in the middle of its stroke and the best point of its power when the piston of the air engine (driven) is approaching the end of its stroke, where it meets the greatest resistance from the compression of the air.

The valve boxes of the air cylinder are shown at *g*; they serve also the purpose of the covers at each end of the air cylinder, and are bolted direct to the receiver *b*, without the intervention of piping, the communication being thus rendered direct from the air cylinder to the receiver. The inlet valves are shown at *h*, in the center of the cylinder covers or valve boxes, the bosses of the valves fitting round the piston rod and containing the stuffing boxes. A stop, *i*, is placed on the outside of the boss of each valve, so as to limit its opening to the required extent. An enlarged view of the valves is shown by Fig. 3, page 3. By reason of the frictional hold of the stuffing box valve upon the piston rod, it is drawn to and fro by the motion of the latter to the extent allowed by the stop. Thus, as the piston begins to recede, the rod immediately carries the valve with it until its progress is checked by the stop, it being then full open, and the rod continuing its movement through the valve, holds the latter fully open to the end of the stroke. On the commencement of the return stroke, the valve is immediately pushed up to its seating and closed, in the same manner. As this movement takes place when the crank is almost on its center, and the motion of the rod at its slowest, the valve is brought to its seating gently and without any violent concussion.

The delivery valves are shown at *j*, and consist of a number of small valves distributed over the surface of the cylinder cover or valve box, and affording a large area of outlet opposite the direction of movement of the piston, thereby avoiding the cross currents of air, and the generation of frictional heat previously alluded to. The inner surfaces of the valves are rounded off, so as to present an opening as nearly as possible approximating the form of the *vena contracta*, and to reduce the friction of the air in passing through. They can easily be removed when required, for cleaning or repairs, without disturbing any fast joints.

To actuate the valve of the steam engine the eccentric *k*, acting through the lever and rod *l*, imparts a to-and-fro motion to the lever *n* from its center *o*, which is raised or lowered in the guides *p*, according as the pressure of air in the receiver, acting against the plunger *q*, increases or diminishes. The lever *n* has a groove cut on the face throughout its entire length, into which gears the projecting pin *r* on the valve

lever *s* working from a fixed center, so that the to-and-fro movement of the lever *n* is imparted to the valve lever *s*, shortening its stroke and the stroke of the valve as the center of the lever *n* rises, thereby reducing the speed of the engine, and lengthening the stroke of the valve as the center of the lever *n* lowers, and thus increasing the speed of the engine. When the center of the lever *n* comes opposite the pin *r* of the lever *s*, the movement of the latter is entirely stopped, and the engine is brought to a standstill. By means of the weight *m*, which can be fixed in any position along the rod *m*, the regulator may be set so as to take effect at any required pressure. This enables the machine to vary its speed automatically, to suit the varying demands for the supply of air to the air-driven engines, according as the latter may be stopped or started.

The New Swedish Naval Arm.—A new rifle has recently been adopted for the Nor-

Caliber, 12.17 millimeters; length of barrel, 950 millimeters; number of rifle grooves, 6; twist, 1 in 87; weight of cartridge, 35.61 grams; length of cartridge, 51.95 millimeters; weight of ball, 24 grams; charge of powder, 4.25 grams; the weight of the arm, without the bayonet, is about 9 lbs.

Laws Relating to Commercial Travelers' Licenses.

The following digest of the laws of different States, relating to the licensing of commercial travelers, was made for the *Northwestern Commercial Traveler*. It is complete with the exception of Delaware, Rhode Island, Tennessee, Texas and Colorado:

The following named States have no statute requiring non-resident commercial travelers to hold special licenses: Alabama, California, Connecticut, Florida, Georgia, Illinois, Iowa, Kansas, Kentucky, Maryland, Massachusetts, Maine, Minnesota,

travel from place within this State for the purpose of carrying to sell * * * or to take orders for the purchase of goods, wares, or merchandise, by exhibiting samples, lists, catalogues, or otherwise," he "shall pay into the State Treasury * * * the sum of \$50." Licenses are renewable annually, and they may be granted for "any term less than a year upon payment of a ratable proportion of the duties hereinbefore prescribed." (Revised Statutes of Michigan, chap. 22, secs. 15 and 17.)

Nebraska.—There is a statute in the State of Nebraska requiring non-resident commercial travelers to take out special licenses, but it is claimed to be unconstitutional and void. "Its construction and effect is now a matter of litigation." (H. H. Wheeler, Secretary of State.)

Nevada.—The laws of Nevada require the payment of from \$10 to \$20 per month in each county for license to sell by samples, lists, catalogues, &c.

person who shall travel from place to place on foot, by horse and wagon, or by team, within this State, for the purpose of selling or offering for sale, at retail or to consumers, any goods, * * * whether by sample or otherwise, and whether said goods * * * are delivered at the time of sale or to be delivered at some future day, is hereby required to take out a license, in accordance with the existing laws of this State relating to hawkers and peddlers." (Chapter 269 of the Wisconsin Laws of 1878.) "The sum required of commercial travelers is \$15." (H. Kleinpell, Treasury Agent.) In addition to that there may be village and town licenses, when they have been authorized by charters of the towns, &c.

Austin and Galveston, Tex.; Denver, Col.; Little Rock, Ark., and St. Louis, Mo., have no city ordinance requiring non-resident commercial travelers to take out special licenses.

Memphis.—There is an ordinance in the city of Memphis, Tenn., imposing "special license tax on commercial travelers, but this has been decided against by the courts, and they are now licensed under the general head of merchants at the rate of \$25 per annum." (C. Belcher, City Registrar of Memphis.)

Savannah.—Savannah, Ga., has an ordinance requiring "every drummer, runner, or other person soliciting trade or orders, or business for another or for himself, whether resident in the city or elsewhere, and having no fixed place of business in this city, * * * and every transient person selling or offering to sell by sample, shall pay the same tax required of resident and stationary dealers in the same article, without reference to the time of year when the business is commenced; and no such itinerant dealer shall be allowed to sell his wares under the license of any auctioneer, or under the name of any factor or commission merchant who has paid his tax as such, until he himself shall have paid all taxes required by this ordinance." (Section 6, page 11, Revenue Ordinances of Savannah, Ga., for 1878.)

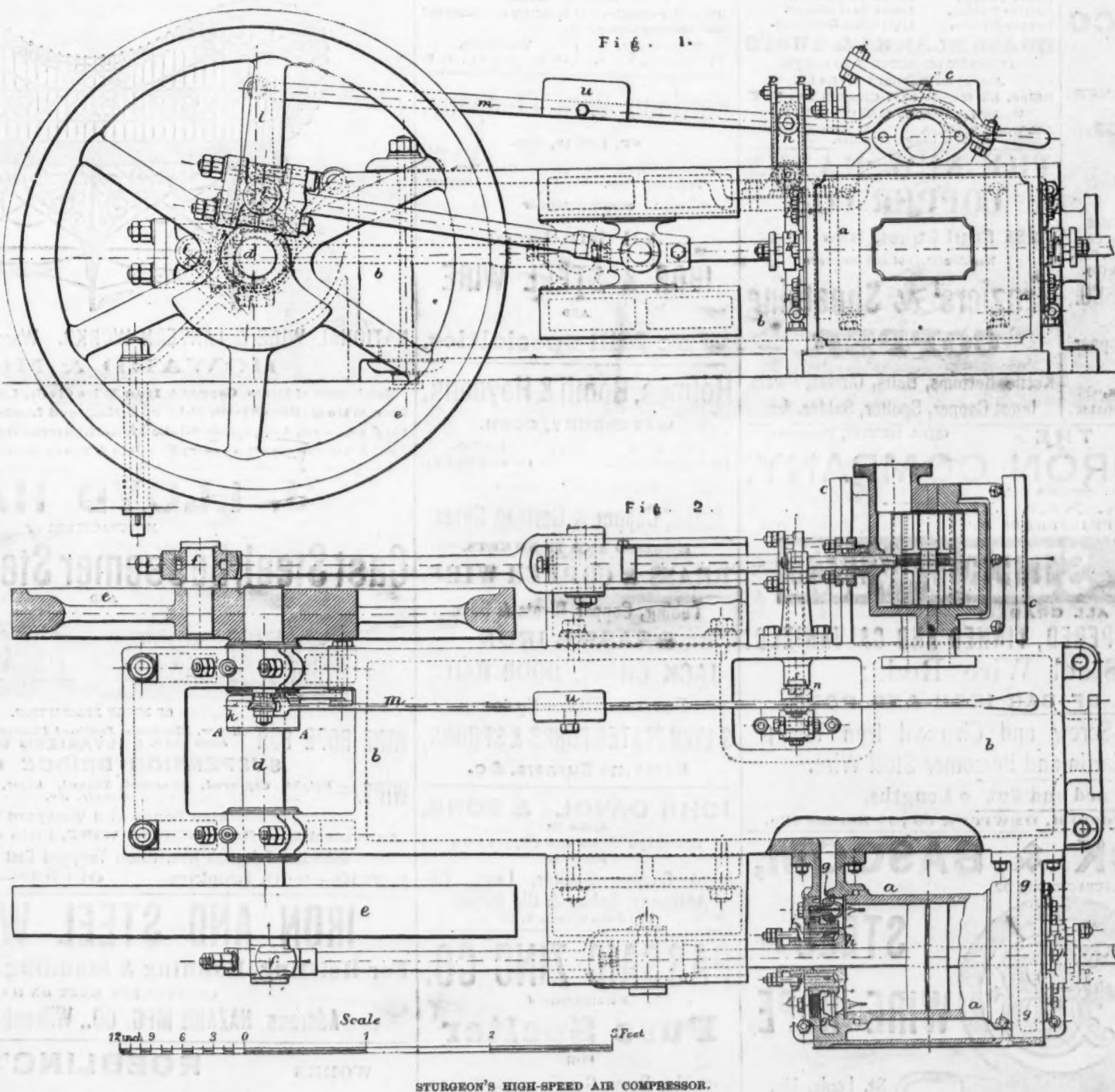
San Francisco.—There is an ordinance in the city of San Francisco, Cal., requiring commercial travelers to take out special licenses, "but it has been declared unconstitutional by the courts." (John A. Russell, City Clerk of San Francisco, Cal.)

Washington City, D. C., has an ordinance declaring that commercial agents shall pay \$200 annually. "Every person whose business it is, as agent, to offer for sale goods, wares, or merchandise by sample, catalogue, or otherwise, shall be regarded as a commercial agent." This clause takes effect April 1, and, if paid thereafter, an amount is payable proportional to the unexpired portion of the year. (Robert P. Dodge, Treasurer of D. C.)

American Wheat in Spain.—According to a dispatch received at the Department of State from the American Consul at Barcelona, the first cargo of American wheat ever received in that city arrived about the middle of November. Great interest was excited in Barcelona thereby. Samples were freely and in-

terestedly handled on the Exchange on the day of arrival, and it was immediately recognized as equal to Black Sea and Hungarian wheat. The cargo consisted of 72,000 bushels, and sold at 19 francs per 55 kilograms, or about \$3.70 per 120 pounds. This first cargo was brought to Barcelona in an English steamer. The freight upon the same amounted to \$18,000, and the same steamer was again chartered to bring another cargo of wheat from New York. The consul knew of one firm which had engaged three English steamers to bring three cargoes of American wheat to Barcelona, and it was thought that about 25 cargoes would arrive during the season, all in English steamers. The consul reiterates former opinions upon the great necessity of direct American steam communication with Spain and other countries bordering on the Mediterranean.

The Birmingham Wire Gauge.—At a meeting of the Glasgow Chamber of Commerce, held recently, a report was submitted with reference to the desirability of establishing a uniform wire gauge. In the report it was suggested that the Chamber should concur with the Birmingham Chamber, in asking Parliament to supplement the Weights and Measures Act, 1878, by a clause instituting a legal standard to be recognized as a wire gauge.



STURGEON'S HIGH-SPEED AIR COMPRESSOR.

wegian Marine, named after its joint inventors, Kragg-Petterson, M. Kragg being a lieutenant in the artillery, and M. Petterson a Swedish engineer. According to a description in the *Militär Wochenblatt*, this arm may be classed among repeating rifles, from the ordinary form of which, however, it differs in the fact that the successive cartridges are not placed in position automatically, but require a particular action on the part of the operator. The magazine or reservoir is placed in the stock below the barrel, and contains nine cartridges, in addition to one with which the gun is already loaded. The breech action is an adaptation of the Remington and Peabody systems, with the following additional movement: In order to reload the gun from the reserve cartridges, the movable breech is opened and brought down in such a manner as to open and come in line with the after end of the reservoir; by pressing a spring at the fore end of the reservoir a new cartridge is pushed back into the breech piece, which is thereupon closed, and the gun is ready for firing. The gun can be loaded in the usual manner, if desired, without bringing into action the magazine, which is filled by sliding the cartridges in one after the other from the breech end. The mechanism has been found to work well after careful experiments, and the following has been determined on as the size of the weapon:

Mississippi, Missouri, New Jersey, New York, New Hampshire, Ohio, Oregon, South Carolina, Vermont, West Virginia. In California, Connecticut, Florida, Georgia, Minnesota and Pennsylvania, each incorporated city may require them by passing ordinances to that effect.

Indiana.—The statutes of Indiana provide that "traveling merchants * * * who are not residents of this State" shall pay from \$3 to \$50, according to the amount of capital used. The license is required for vending foreign merchandise only. Tea and coffee excepted. (Davis' Revision Statutes of Indiana, vol. 1, page 617. Act of 1852, sec. 1.)

Louisiana.—The statutes of Louisiana provide "that there shall be levied and collected an annual amount, as a license or tax," "from every non-resident sample merchant, agent, salesman, or employee of any foreign mercantile house or manufactory, who sells or contracts for the sale of merchandise, ardent spirits, wines, liquors, or any mixture thereof, by samples, list, description, or otherwise, \$100 for every sale thus made without said license, recoverable as other fines, one-half of which shall go to the informer." License obtained from any tax collector (Act No. 8, sec. 3, page 25, Statutes of Louisiana).

Michigan.—The statutes of Michigan provide that "no person shall be authorized to

North Carolina.—The statutes of North Carolina provide that "every person acting as a drummer in his own behalf, or as agent for any other person, who shall sell, or attempt to sell goods, wares, or merchandise, not of his own manufacture, or any spirituous, vinous, or malt liquors, with or without samples, except agricultural implements, &c., shall, before soliciting orders or making any such sale, obtain a license to sell for one year from the public treasurer, an annual tax of \$50, but shall not be liable." (Revenue Act of North Carolina, sec. 24. Approved March 10, 1877.)

Pennsylvania.—There is no statute in Pennsylvania regarding commercial travelers, except one prohibiting the sale of liquors.

Virginia.—The statutes of Virginia provide that "the specific license tax for the privilege of selling by sample, card, description or other representation, shall be \$100." Said license is not transferable. For each additional agent or salesman employed to sell, as aforesaid, there shall be an additional tax of \$50. Non-resident commercial travelers are required to hold the regular "merchant license," in addition to the above special license, ranging from \$5 upward, according to the amount of capital employed. (Revenue Laws of Virginia, secs. 28 and 35.)

Wisconsin.—The statutes of the State of Wisconsin provide that "each and every

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SEE PAGE 9.

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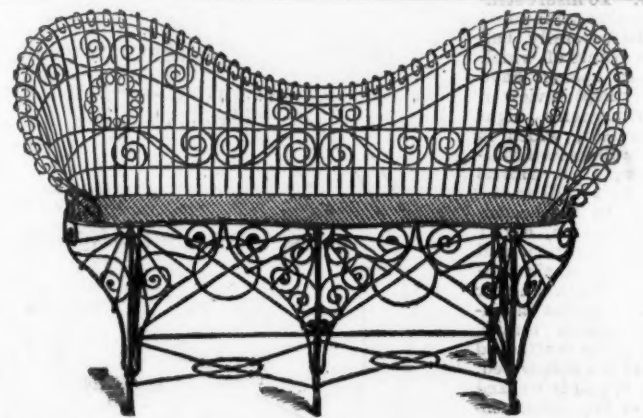
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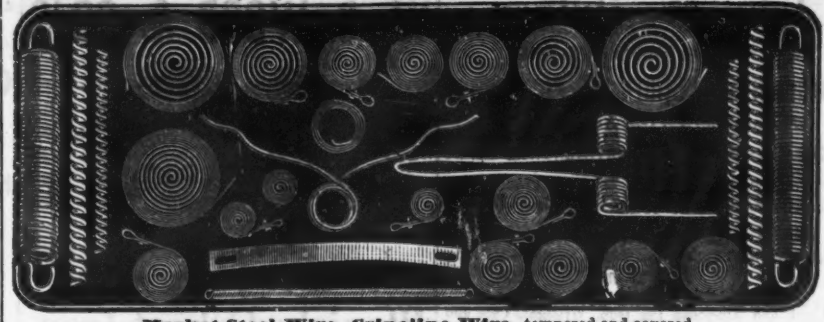
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VERNAL & SIEG, 100 Chambers St., New York Agents.**Conservatism in Trade.**

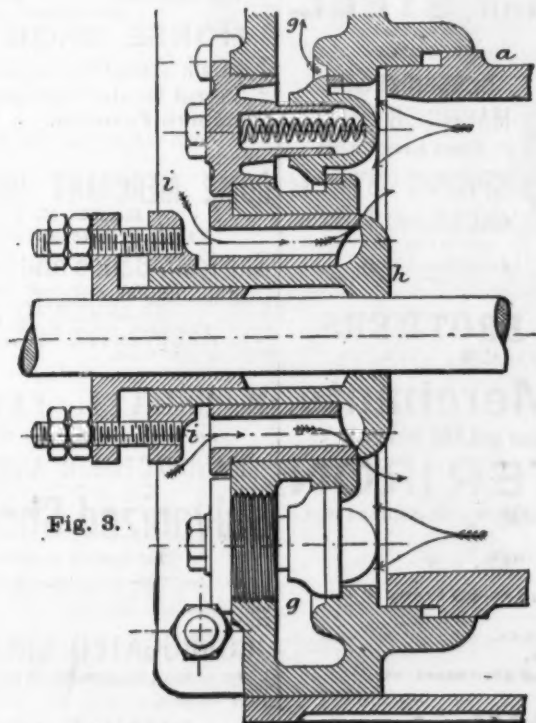
To the Editor of the Iron Age: It is frequently asserted that "we know too much now, have too many facilities for the transfer of goods, too rapid means of communication, and other unnecessary and hurtful innovations, which unsettle business and keep the dealer in constant anxiety and alarm."

Such assertions do not require argument, and only serve to show the conservative ideas of those who are living, or would like to live, behind the age. They prefer the good old times, when a foreign invoice was a hundred days or more in reaching its destination, and when business was confined to little local monopolies. They do not seem to have learned as yet that existing facilities stimulate competition, which is the life of trade; that competition develops the character, the energy and the independence of the people, and by bringing to our doors a profusion of foreign products, supplies us with the means of increased comfort, knowledge and aesthetic taste.

There is another short-sighted, conservative element, constantly assigning a single and immediate cause for each existing condition of trade, unable to appreciate that, in a complicated system of civilization, simultaneous causes act and react upon each other, until it is impossible to fix upon any individual cause as responsible for a final effect. We were recently informed that "the sole and only cause of the present depression was the introduction of machinery into every branch of labor—machinery, which neither eats, nor wears clothing, yet throws out of employment a flesh and blood equivalent that would do so, if possessed of

Again, war draws into the field a multitude of producers, who immediately become only consumers and destroyers, giving an unnatural stimulus to production of every kind; prices rise, money (especially paper) is plenty, the manufacturer at home becomes wealthy, and is satisfied with existing conditions, as are his workmen. But the war closes, the ravager and destroyer returns to his home and seeks employment, consumption assumes its natural proportions, and the increased number of producers, with the aid of improved machinery, make an apparent glut in the market; but the cause was the war, not the machinery, and there is in reality no overstock, while there are thousands of hungry consumers, half clothed and forlorn, in every city and township. The trouble lies elsewhere. If it were not for the existence of such deplorable and unnatural institutions as war, speculation, intemperance, and the like, we should ride easily and smoothly over such minor disturbances as the occasional introduction of machinery in our shops. Every machine that lightens the mere drudgery of labor, elevates and ennobles the workman. He becomes the brain of the machine, and rises through the various grades; the laborer becomes the artisan, the artisan the artist.

It is said that the mechanics of to-day are inferior to those of old, owing to hand processes being replaced by machine work. But is the work any the worse done? Within the memory of some, lathe shears were chipped and filed, as were the teeth of wheels, &c. Does any one suppose they were superior to the shears or gear wheels of the present, though the man with the chisel and file may have possessed a dexterity unnecessary to the man who controls the



STURGEON'S HIGH-SPEED AIR COMPRESSOR.—(See page 1).

means." It would seem unnecessary to re-
vive the proofs which show machinery to be
a blessing to mankind, did not an occasional
few seem to be in the dark on that point.

In the first place, machinery is more often
the result of hard times than a cause. The
popular demand for reduced cost must be
met by time and labor-saving tools, and no
period has been more prolific of such tools
than the last five years of depression. Ma-
chinery cheapens the cost of production,
consequently the cost to the consumer, and
brings the product into easier reach of the
masses. Though a few workmen may be
temporarily thrown out of employment, the
community is benefited, and the good of the
greatest number must be provided for. Such
hands soon drift into other channels of
labor, perhaps into the making of the very
machines that displaced them; or the in-
creased demand, arising from the reduced
cost of the manufactured goods, will sooner
or later draw the idle into employment. A
hand or a number of hands are liable to dis-
charge at any time from a variety of
causes, many of them less justifiable and
more hurtful to the employee than the sub-
stitution of labor-saving machinery. The
introduction of almost every new process
has been the means of displacing hands in the
old line of work. Shall the world halt in its
progress, because a few are temporarily in-
convenienced? The man displaced will prob-
ably live to feel the benefits of the advance-
ment—his children certainly will. In spite of
occasional grumbling, the workingman was
never better off than during the present
generation. Many have risen in education
and refinement, until deprivation of the
luxuries seems a positive calamity, while be-
fore the era of machinery the hours of
labor were longer, and the condition of the
workman, both at home and in the shop,
more primitive and degraded. If machinery
were abolished, the mechanic would soon
find himself in a sad plight—a limited sup-
ply of everything, enormous prices, and the
comforts of life gradually passing into the
hands of the wealthy few.

Cheapening by enlarged production is not
harmful, but the reverse, if we can maintain
the relative value of our products. If an
abundant crop and consequent low price of
grain does not make a return to the farmer
for the outlay in fertilizers and freights, it
is because those prices are relatively too
high. Here, then, seems to be a compre-
hensive cause of trouble, of which labor-
saving machinery is but a small and in-
significant factor, viz., the disturbance in re-
lative values, largely the result of speculation,
war, &c. That a class of men, possessed
or not possessed of a large amount of cap-
ital, should be able to buy and bear the mar-
kets upon unsubstantial and fictitious
grounds, tampering with the necessities of
life and frequently depriving the masses of
sufficient food, is a keen satire, in this coun-
try, upon the boasted supremacy of the
people.

planing machine or gear cutter. But there
is no reason why the mechanic of to-day
should not be, in every respect, the equal of
his predecessor. A good mechanic is al-
ways a good mechanic, according to the
requirements of his period, and the higher his
sphere of action, the more dignified is his
position and the more useful the results of
his labor.

Let us, then, accommodate ourselves to
the progressive tendency of the times, and
when studying causes and effects, though
individually we may be smarting from the
immediate results of some beneficial inno-
vation, let us look with the eyes of the world
at large, and be willing to suffer for the
moment to secure the final good of all.

C. E. BUEBY.

PHILADELPHIA, Jan. 6, 1879.

Traveling in 1841.—The late Henry
Wells, who was the founder of the Ameri-
can express system, once delivered before
the Buffalo Historical Society a paper upon
that enterprise. His description of the rail-
road route from Albany to Buffalo at that
time, 1841, when he made the trip weekly,
suggests at once the contrast between rail-
road traveling then and now. The railroad
was a strap rail, very suggestive of snake
heads, and given to run-offs, and the com-
mon road, of which there were 65 miles,
might be endured in summer, but in the
spring and fall was simply horrible. "I have
been 18 nights out of 21 upon the road, and
'still live.' We left Albany in the evening
—one sent for myself and one for my
money trunk; the other trunks were in the
baggage car. Arriving at Utica at 3 in the
morning, it is almost ludicrous to recall the
fact that we, all the Westward-bound pas-
sengers, were forced to remain for two hours
till a locomotive should arrive from Syra-
cuse. Then we went as far as Auburn
by rail, and then 'Sherwood's' coaches
brought us to Geneva, and often the only
place to trot was on the Cayuga bridge. We
found rail again from Geneva to Rochester
and Batavia, and then it took 40 miles of
staging to enter Buffalo."—*Albany Argus.*

The London Daily News of December 28
says: Instead of Christmas turning the
tide of events, or reviving the cotton trade
at Blackburn, the markets have gradually
dwindled, and this week there has been less
employment than ever. Six mills are at a
standstill through bankruptcy, and others
are definitely closed for three weeks. Those
best versed in the cotton trade say the pros-
pects of improvement are far from immedi-
ate. The Oldham cotton-trade strike, how-
ever, appears to be approaching the end, as
there are large numbers of operatives re-
turning to work at the reduction of wages.
It is calculated that 500,000 spindles have
been restarted during the past two weeks at
the reduced rate.

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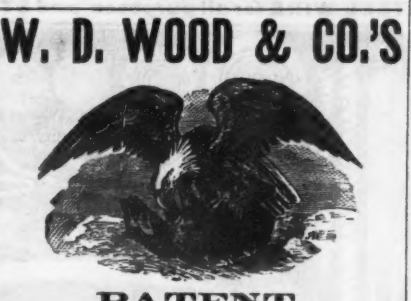
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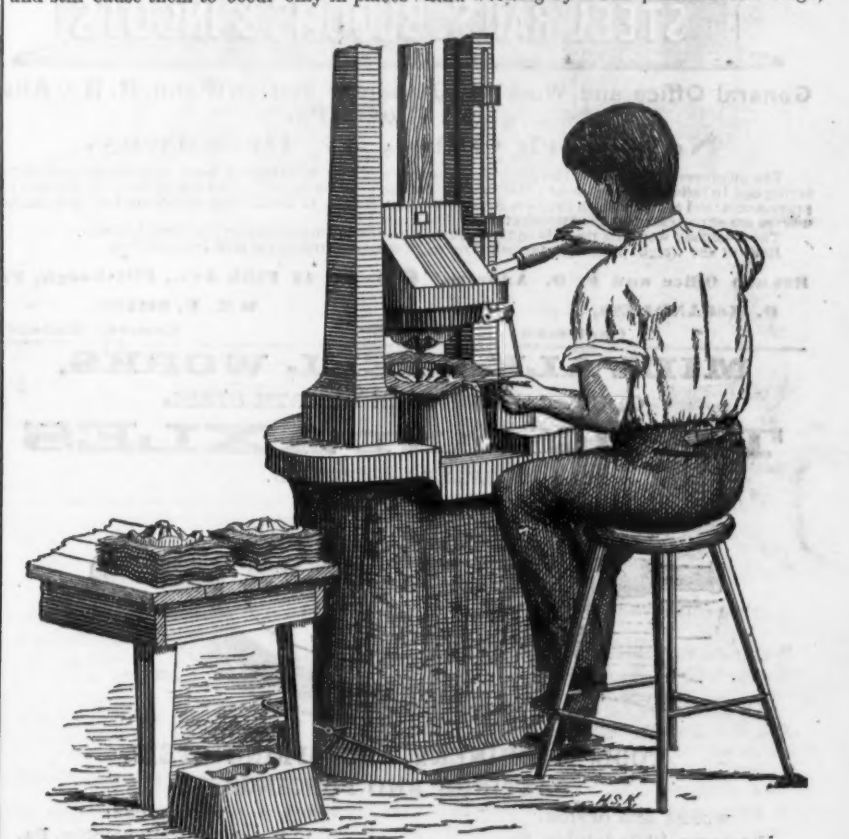
ZINC STAMPING.—III.

**Process of Making Dies and the Presses
Employed in Stamping.**

Whatever may have been the hopes of the
pioneer company as to the possibility of
accumulating such a stock of designs in its
dies that no further additions would be
necessary to enable it to meet all demands,
it has been the experience of each of the
concerns who have prosecuted this indus-
try that, to meet the current requirements
of architects, new designs are constantly
necessary. It follows, therefore, that the
process of die-making is of great importance,
not only as concerns the first equipment of
an establishment, but also as a part of its
routine work. The first step in die-making
is the modeling of the article to be pro-
duced. An exact representation of the article
required—leaf, rosette, scroll, or whatever it
may be—is formed according to its size and
the relative fineness of its parts, either in
clay or wax. From this model a reverse cast
is taken in plaster. The reverse cast is in
one or several pieces, according to the size
of the article, or as determined by the depth
or the requirements of draft. The divisions
between the different casts, where taken
in parts, correspond with the joints
that must be made in finishing the article
after stamping, and considerable
skill is required in locating them to best ac-
commodate the requirements of stamping,
and still cause them to occur only in places

where they can be most readily made and
concealed. The reverses, or negatives, thus
obtained constitute the pattern of the die.
They are properly filled out, upon the back,
until the shape and size necessary to give the
 requisite strength to the die is obtained. From
this pattern a duplicate is made in cast iron.
The character of the iron employed deter-
mines the quality of the die. A soft iron,
and one flowing freely, is the most desir-
able, because it produces a surface that is
easily dressed and cleaned, and by flowing
freely it reproduces the fine lines of the pat-
tern. The die in the rough is first cleaned
of sand and scale by ordinary means. It is
afterward subjected to a careful trimming
and sharpening by means of small files and
chisels. Any defects in the surface are
supplied by plugging with soft wrought iron,
and the whole is carefully smoothed and
polished. The skill with which this part of
the work of making the die is performed,
determines the finish of the article to be
produced by the use of the die.

Instead of using cast iron, dies are occa-
sionally cast in zinc. The chief advantage
of the use of zinc instead of iron, lies in the
fact that by the use of the former dies can
be made without the delay incident to send-
ing a pattern to a foundry. The scrap zinc
from trimming the work produced is ordi-
narily melted and run into slabs before
marketing, and a portion of this scrap pro-
duct is always kept melted, from which to
cast the forces or male dies in process of
stamping. A flask, a small quantity of
molding sand and a few molding tools, and
a workman of tolerable skill in molding, in
connection with the melted metal always
in readiness for pouring, constitutes all the
equipment necessary to produce zinc dies
upon very short notice. From the fact
that the remelted zinc is just as saleable
in the form of dies as in the
shape of slabs, and that therefore the
dies need not be melted over after using,
the use of zinc for dies is less expensive
than would at first appear. Zinc is much
softer than cast iron, and consequently a
zinc die will not wear nearly so long as a
cast-iron die. A zinc die, however, requires
far less labor in cleaning and dressing than
an iron die. For all dies from which only
small strikings are required, except unusu-
ally large ones, zinc is undoubtedly the most
advantageous for use, and occasionally it
may be employed in large patterns with
economical results. The plaster patterns of
the dies are carefully preserved for use in
replacing worn-out and broken dies, and in
the case of using zinc dies which are not
kept on hand, for making new dies as re-
quired.



ZINC STAMPING.—PROCESS OF MAKING DIES, AND THE PRESSES EMPLOYED IN STAMPING.

fast-revolving pulley, or in that kind employ-
ing a crank-lifter. The desideratum in a
stamping press for the production of zinc
ornaments, is some arrangement whereby
the force of the stroke may be controlled at
the will of the operator. In the use of the
press employing a strap and pulley, above de-
scribed, a very light blow will first be given,
followed by others of regularly increasing
force, until the last of the series will be im-
parted with all the force to be obtained by
the hammer falling from the greatest height
that it can be raised in the press. By this
means the metal is carried down more rapidly,
that is, with fewer changes of hammers or
forces, and with less liability to fracture.

Steel Armor Plates and Projectiles.

The London News says: We are not only,
it seems, to have steel-clad men-of-war, but
steel projectiles as well, for the gunnery ex-
periments at Shoeburyness prove beyond a
doubt the efficacy of these missiles. There
is one Whitworth projectile, we are told,
which has twice penetrated an iron target of
12 inches, without being any the worse for
the process. It is made of what is termed
compressed steel, and the only proof it bears
of having passed through the solid iron plate,
is the fact that it is shorn of the projecting
studs of brass. For its second journey, it
was only necessary for the projectile to be
restudded, and it then fitted the gun as ac-
curately as before. Very little is known as
yet of the action of steel shot against steel
armor; but so far as experiment has gone,
it appears pretty evident that, by the aid of
such projectiles, guns will once more gain
the ascendancy over armor. A steel plate
will repel an ordinary chilled shot which
passes easily through an iron plate. Thus
at Spezia, when the 100-ton gun of Sir Wil-
liam Armstrong was proved, it was found
that, while a 22-inch iron plate was readily
pierced, a steel slab of the same thickness
effectually repulsed the shot. The steel got
fractured in the trial, but it did not allow
the shot to pass. For the moment, there-
fore, armor triumphed over gun; for, as
long as a battle-ship can keep out an enemy's
shot, it is a matter of little importance
whether her metal scales suffer. For this reason
the Italians, the French and our-
selves are all contemplating the building of
steel-clads. But now comes the question,
whether steel shot cannot injure steel armor
as fatally as the chilled projectiles damage
our ironclads. This is exceedingly prob-
able, and if so, we shall be no better off than
we were before. The only difference will
be that the cost of production, both of armor
plates and projectiles, will be magnified. We
shall be able to afford but one steel-clad
battle ship for every three or four ironclads.
Just as we have ceased to count our rail
of the line by the hundred, and now number
ironclads by tens, so in the future, when it
comes to the adoption of steel in the navy,
our battle-ships will be represented in units.

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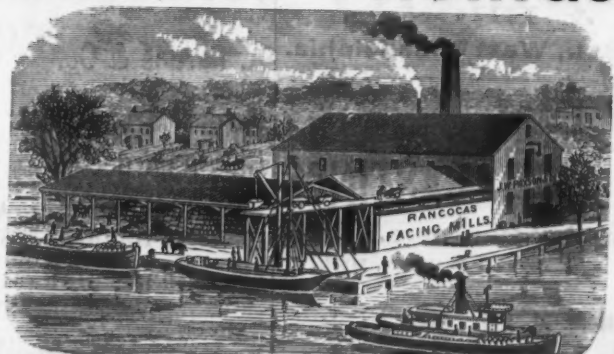
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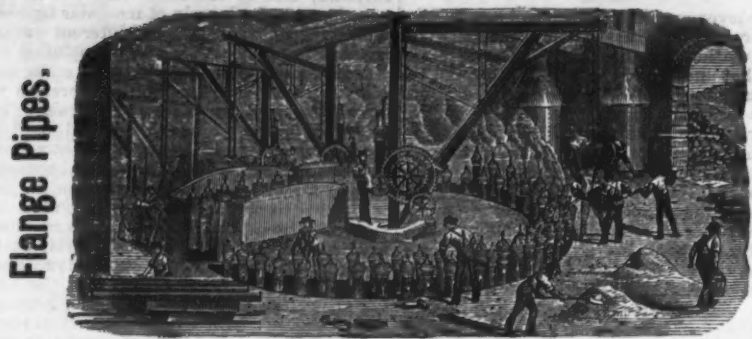
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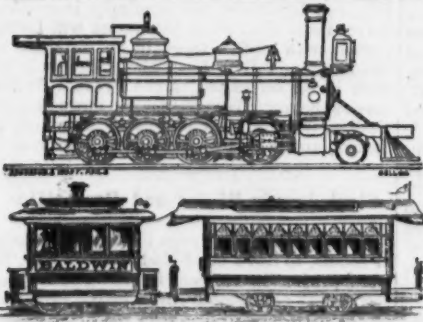
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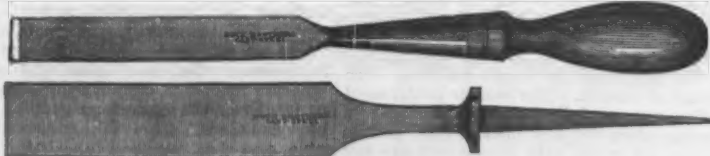
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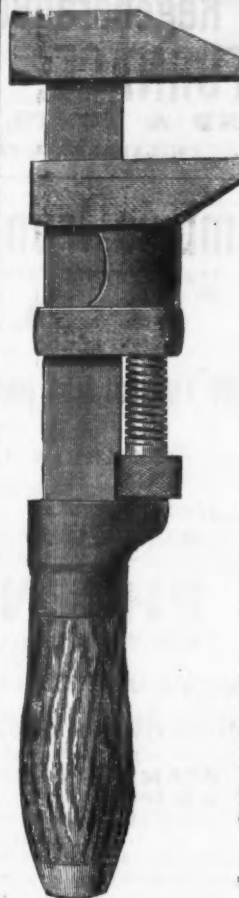
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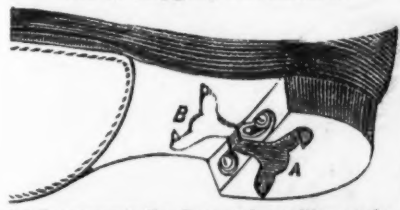
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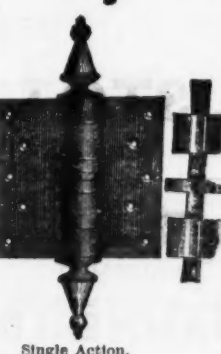
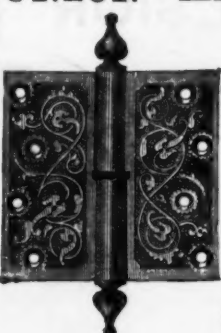
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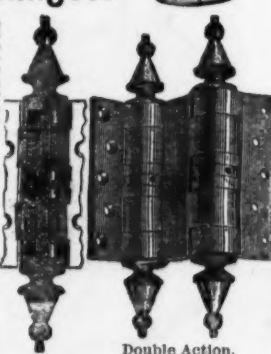
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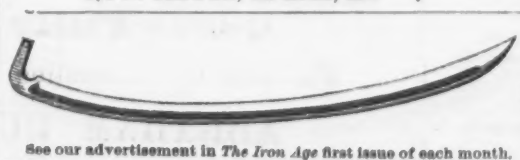
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HUNTINGTON, HOPKINS & CO., Sacramento.
NATHAN WEED, 4 Gold Street, New York.

The Electric Light.

(Continued.)

The Brush machine (Fig. 2) has for its
magnetic field two horse-shoe electro-mag-
nets, with their poles facing each other, the
circular armature rotating between them.
The latter is not entirely covered by the
coils, of which there are eight, opposite ones
being connected end to end. The terminal
wires are carried through the shaft to a
point outside the bearings to the commu-
tators, which are so arranged that at any
instant three pairs of coils are interposed in
the circuit of the machine. The machine is
run at high speed and is frequently used in
this country.

The Wallace-Farmer machine, (Fig. 3), has
a magnetic field produced by two electro-
magnets, with the poles of opposite char-
acter facing each other. Between the arms
of the magnets, and passing through the up-
rights supporting them is the shaft, carrying
at its center the rotating armature. The
latter consists of a disk of cast iron, near
the periphery of which, and at right angles
to either face, are iron cores wound with
insulated wire, thus constituting a double
series of coils. These armature coils being

inferior to the others, although it uses in
electrical work a large amount of power in a
small space. In the English experiments the
Gramme and the Siemens machines were
pitted against each other. It was proved
that to produce the same light a Siemens
machine would weigh 3 cwt., as against 25
cwt. for the Gramme, and would require to
drive it but 3.3 horse-power, against 5.5
for the Gramme, giving a proportion of
light produced per horse-power of 2080
for Siemens to 1257 for Gramme. Thus
one Gramme machine would weigh more
than eight Siemens machines of equal
power; its cost of driving would be
nearly double, and in addition to these points
in favor of the Siemens machine, the prime
cost of the machine is as 100 for Siemens to
320 for Gramme; that is to say, that three
Siemens machines cost less than one Gramme
machine of equal illuminating power. It is
but just to the representatives of the French
machines to state that they fully acknowl-
edged the accuracy and fairness of the ex-
periments made, notwithstanding their un-
favorable issue. It has since been claimed
by them that important improvements have
been realized. The machine still maintains
its popularity in France. The economy, effi-
ciency and durability of the machines are of

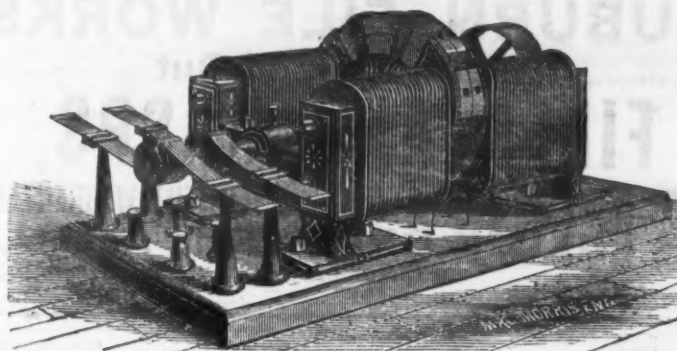


Fig. 2.—THE BRUSH MACHINE.

connected end to end, the loops so formed
are connected in the same manner on to a
commutator of the same construction as
that of the Gramme. As the armature rotates
the cores pass between the opposed north
and south poles of the field magnets, and the
current generated depends on the change of
polarity of the cores.

Lontin has brought out a dynamo-electric
machine, constructed in such a manner that
the inducing electro-magnets shall have a
retary motion, while the induced bobbins
remain stationary, thus reversing the ordi-
nary method of working this object to
produce any number of electric lights. An
induction wheel revolves in front of the
poles of a series of electro-magnets. The
bobbins of the induction wheel are in this
case the inducers; they are transformed
into electro-magnets by the current of a
spare magneto-electric machine passed
through them, and on rotation of the wheel
they induce in the surrounding bobbins a
series of currents, which may be utilized
without employing any collector or contact
ring. For example, in a machine having
50 induced bobbins there would be 50 sources
of electricity, which could be used either
separately or combined. The wheel or cen-
tral inductor of the "distributor," as the
whole machine is called, is magnetized by
the current from an ordinary machine.
Recently a machine has been constructed

course one of the prime factors in the future
commercial success of electric lighting, and
there is reason to believe that the rapid pro-
gress of late years, will lead to the construc-
tion of perfected apparatus running at low
cost and with very little wear and tear.
Having sketched the modern apparatus em-
ployed for generating electricity, we will
now refer to the appliances by which the
light itself is produced.

(To be continued.)

A French View of American Trade.

In a recent number of the *Journal des
Debats*, M. Paul Leroy Beaulieu discusses at
some length the condition of American com-
merce. Regarding the whole of this ques-
tion with special reference to the subject of
free trade, the writer endeavors to show
from the history of trade in the United
States, that the system of protection has,
even from our own point of view, been a
complete mistake. After giving the neces-
sary figures from the *Bulletin de Statistique*,
he points out that whereas until 1872 the im-
ports into the States considerably exceeded
the exports, ever since that year the bal-
ance has been the other way, and there has
been a constant increase in the exports,
coupled with a falling off in the imports.

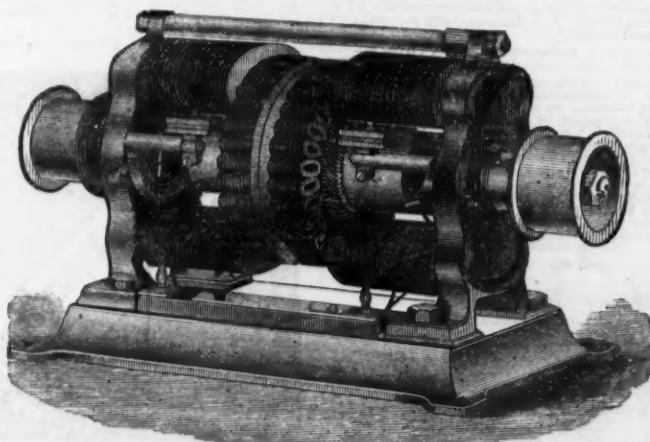


Fig. 3.—THE WALLACE-FARMER MACHINE.

by De Meritens, which is really a combina-
tion of the principles of the Gramme and
the Alliance machines, its special feature
being that it has no commutator. The pre-
sent Siemens machine, which is a favorite in
England, has an induction coil, with the
convolutions of the copper wire wound
lengthwise with the cylinder, in the form
known as the modified Siemens armature.
This coil is made to revolve by mechanical
means between curved iron bars, which are
the prolongation of the cores of large, flat
electro-magnets placed on either side of the
induction coil, the north pole of the system
being midway between the two upper elec-
tro-magnets and directly over the axis upon
the bar between the lower magnets. The
portion of the coil which during its revolu-
tion is traveling downward, has positive cur-
rents induced in it, while the ascending half
of the coil is subjected to negative currents,
but both in the same direction as regards
circuit.

As for the relative efficiency of the vari-
ous systems of dynamo-electric machines,
we are in possession of two valuable reports,
one made by a committee of the Franklin
Institute in May and June, 1878, and another
made in England by Dr. Tyndall and Mr. J.
N. Douglass to the corporation of the Trinity
House. The first embraces the Gramme, two
sizes of the Brush, and a Wallace-Farmer
machine, the result arrived at being that the
Gramme was the most economical, giving in
the arc a useful result equal to 38 per cent.
of the power used, the larger size of the Brush
machine 31 per cent., the smaller Brush ma-
chine 27 per cent. The Wallace-Farmer was

M. Beaulieu regards this phenomenon, to-
gether with others of a similar kind, as
another proof that the prosperity of a coun-
try is not only consistent with an excess of
imports over exports, but is actually most
often accompanied by it. Examining in
the next place the list of articles most fre-
quently imported and exported from the States,
the writer observes that manufactured
goods occupy a very insignificant place, and
the inference he draws from it is very un-
favorable to them. By putting prohibitive
tariffs on manufactured foreign goods, and
so keeping them out of the country, the
American government has seriously checked
and starved a branch of industry in which
its subjects were highly qualified to excel—
the fabrication of machines. Passing fi-
nally to the subject of maritime commerce,
the writer asserts that the same conclusions
may be extracted from his statistics. Nearly
three-quarters of the goods imported into
the States are carried by foreign vessels,
while of the exports no less than 78 per cent.
is conveyed under a foreign flag, against 22
per cent. in American vessels. Compare
this with the fact that American ship own-
ers are protected against their rivals by a
formidable protective tariff, and there is a
strong *prima facie* case made out against
protection. Nor does it appear that time is
likely to effect any alteration in the state of
affairs, considering that while the exports
carried in American vessels only increased
during the last year by \$3,000,000—from
156 to 159—those transported in other ships
rose in value from \$515,000,000 to \$557,000,
000.



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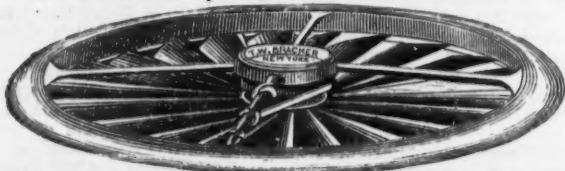
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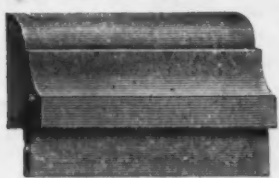
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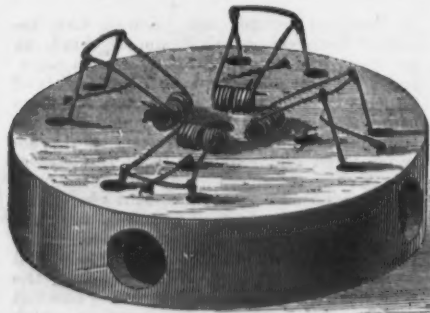
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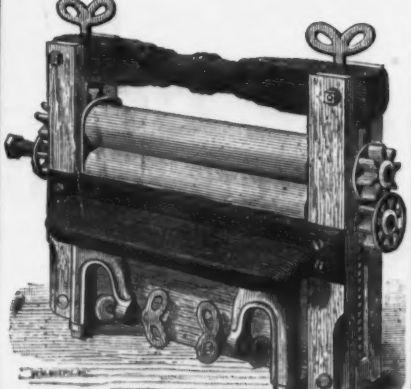
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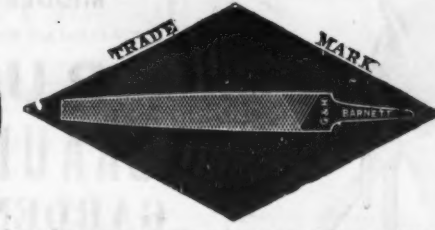
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|-------|----------------|----------------|
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As shown in the illustrated section herewith it
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can be sharpened by grinding without changing their
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A REVIEW OF British Iron, Steel and Hardware During 1878.

(By Our English Correspondent.)

The year now drawing to a close has been remarkable throughout for the depression which has prevailed in every branch of trade and industry in this country. In none has the stagnation been more vividly apparent or more keenly felt, than in the iron and steel trades and their collateral branches. At no single period during the whole of the 12 months has there been any briskness; indeed since last New Year's Day, the history of the leading manufacturers of the whole country has been one continuous record of the want of orders, a constantly increasing home and foreign competition, and of gradually increasing additions to the list of wholly or partially idle establishments. There have been, it is true, occasional glimpses of better prospects, and renewed hopes have now and then appeared to be warranted, but these tentative ameliorations have always proved delusive, so that at the present time the state of commerce and business generally is worse than was the case 12 months ago.

The manufacturers of this country are not alone in their distress, it is true; but the fact carries very little consolation with it, and merely tends to show, indeed, that the cause which affects us here is equally potent in its operation abroad. What the malign influence is cannot be stated in so many words, but whatever its origin and nature, it evidently affects all the world alike, and does not react solely against ourselves. It may be that we lose most, but that is simply and solely because we have most to lose, and not by reason of the "decline and fall" which some imaginative writers obligingly prophesy for us. At home and among ourselves, nevertheless, we have had causes in operation which have had a natural tendency to produce the state of things of which we are now so universally complaining. Prominent among these may be reckoned the reckless and enormous investments made in iron works, collieries, &c., by all sorts of persons during the inflated period of 1871-73. For two or three years a vast amount of capital was thrown into manufacturing speculations, by persons who bought at any price and who had not the most remote idea of carrying on the interests they had acquired to successful issues. With the first falling-off of business, these concerns made various plunges, in the hope of making their several white elephants prove productive; but the march of events has since, as a rule, proved too much for them, and the majority have either gone to the wall, or have closed their premises until the renewal of high selling prices comes to give them remunerative interest on their investments. During their existence, however, they mischievously diverted the legitimate course of trade by under-selling, and by other devices, and now remain monuments of the folly and ignorance of those who took part in them.

Their evil influences have, it must be said, survived them, for the stocks they had accumulated have been thrown on the market, and have been so "slaughtered" as to have had a most depressing effect on the prices of steady and intelligent traders. By this means the colonies and other external markets have been largely overstocked, and in not a few instances the reputation of British manufacturers seriously damaged, whereby we have not only suffered directly, but a strong foothold has been opened for American and other competition. On the whole, therefore, there is very little that is good or laudable to be said of the year 1878, so far as the iron, steel and hardware trades are in question, almost every month having been characterized by lower selling prices, and, what is worse, by failures, in some instances for considerable amounts. The year opened in an indifferent manner, financially and commercially, and it is closing in both those aspects in a most cheerless and disastrous fashion. With the autumn there came a series of bank failures of the utmost magnitude, and these have since reacted on almost every branch of commerce and industry, in a most pronounced way. In Scotland two of the leading banking institutions have given way in the hollowest imaginable collapse; through them a similar institution in the Isle of Man has had to suspend; in Lancashire an old-established private banking-house has crumbled into comparative nothingness, and in South Wales and the West of England a bank with nearly 50 branches has tumbled to the ground like a house built of cards.

All these momentous occurrences could not fail, and have not failed, to shake the stability of the metallurgical interests of the nation, so that at the present time it is no matter for surprise to find that half the blast furnaces, and at least one-third of the puddling furnaces, forges and mills in the kingdom are idle; that scores of firms are unable to secure any profit, and that many others are now in court, or are but just outside the bounds of bankruptcy. The sufferings thus indicated fall not only upon capitalists and investors, but press with redoubled force on the workpeople, thousands of whom are at this moment in want of the work which would enable them to earn their daily bread. When trade was at its best, many of them left the agricultural districts and went to the iron works and collieries, for the sake of the higher wages and less slavish work procurable there. Now that the manufacturing interests are dull, these men find themselves stranded, the farmers being also unable to find them work. Thus wrecked between Scylla on the one hand and Charybdis on the other, hundreds of workmen and their families are in the direst distress, and are likely to remain in a state of misery during the entire winter, unless their wants are overtaken by the charitable efforts which are being made to relieve them. Such of the operatives as are still employed have more than once, as a rule, had to concede percentages of their wages during the year, and at the present time important movements are afoot for securing other reductions of this kind. In all branches of

business the tendency of the day is in this direction, many of the employers being anxious to keep their works in operation, simply to afford their employees the means of existence.

Total Production and Average Price of Pig Iron.

Dealing with the whole of the country in respect of the iron trade, we find that at the beginning of 1878 there were 974 furnaces built, but out of that number only 541 were then in operation, and during the interval which has since elapsed, the latter total has been still further reduced. Last year we smelted about 18,250,110 tons of iron ores (of which we imported over 1,500,000 tons), but this year the quantity when fully ascertained will be found to be materially less—as will also be the aggregate production of pig iron, which, in 1877, reached 6,608,664 tons. In the latter year the average price of Cleveland pig was £2. 5/6—this year the mean quotation is nearly or quite 5/ lower; in 1877 the mean market price per ton of West Cumberland Bessemer pig iron was £3. 12/9—this year it has been about £3. 5/. In 1877 the average of ordinary South Staffordshire pig was £4. 2/3, while so far in 1878 it has been under, rather than over, £3. 12/6; and whereas South Wales hot blast pig averaged £3. 17/6 in 1877, it has, in the period now under review, barely reached £3. 10/. All kinds of finished and manufactured iron, too, have declined in like proportion, and there have been very few sorts of hardwares which have escaped the leveling influences of the period.

Scotland.

Looking at the various principal iron-making districts in detail, we find that in Scotland the total production of pig iron during the year 1877 was 982,000 tons, as against 1,103,000 tons in 1876, or a decreased make of 121,000 tons. The consumption in foundries at home was 175,000 tons, or 20,000 tons fewer than in 1876, and in malleable works 160,000 tons, or 15,000 tons below the figures for the same period of 1876. The quantity of malleable iron manufactured in Scotland during the year was 218,000 tons, as against 230,000 tons in the previous year. The exports (foreign shipments) of Scotch pig iron during the 12 months ending December 31, 1877, were 274,409 tons, as compared with 303,752 tons in 1876; the shipments coastwise, 170,654 tons, as against 166,190 tons in 1876; and the consignments by rail to England about 59,937 tons, as compared with 70,058 tons in the previous year, thus leaving a net decrease in the quantity sent out of Scotland of 35,000 tons. At the termination of 1877 the stock in Messrs. Connal & Co.'s stores reached 168,060 tons, as against 107,798 tons on the last day of 1876, while in makers' hands were 336,040 tons, against 255,202 tons in the year before, a total stock in hand of 505,000 tons, or 142,000 tons over the accumulation left over by 1876. During the 12 months which ended with the last day of December, 1877, the average price of Scotch pig iron had been 54/4, as against 58/6 in 1876; the average number of furnaces in blast, 103, against 116; the number of furnaces in blast on December 25, 86, as against 116 the year before; the number of furnaces existing and nearly ready, 155, as compared with 154; and the imports of English pig iron by rail and water, 353,000 tons, as compared with 285,000 tons during the year 1876. By adding the 335,000 tons of Scotch pig iron used at home to the 353,000 tons imported from England, it follows that 688,000 tons were melted in that country during the 12 months, or 33,000 tons more than during 1876. The average price of Scotch bars during 1877 was £7, as against £7. 15/ in 1876.

Toward the end of 1877 wages were reduced to about 3/6 per day, and during the present year there have been further changes in the same direction. During the year now reviewed Scotch bars have been £6. 10/ to £7, and during the greater portion of the 12 months the number of furnaces in use has been 88, the present exact number being 87. Of the total (155) built, 107 are old style, and 48 gas, the average weekly output of each being 184 tons. Up to the present date this year the average price of warrants has been 7/6 below last year. The total shipments of pig iron from Scotch ports to date in 1878 have been 381,589 tons, of which 227,417 tons have been foreign, and 154,172 tons coastwise—a total decrease this year of 50,501 tons. The quantity now in Messrs. Connal's stores is 199,500 tons, an increase since this time last year of 32,255 tons. In makers' own yards there are probably no fewer than 450,000 tons. From Middlesborough there has been imported a tonnage set down at 274,221 tons, and from England by rail the quantity is (roughly) estimated at about 50,000 tons. Taking the total production of the Scotch furnaces for the whole of this year at 850,000 tons, the imports from Cleveland by sea at 300,000 tons, the imports by rail at 50,000 tons, and the stock actually in hand at the commencement of the year at 505,000 tons, it will be found that the pig iron dealt with in Scotland has been about 1,706,000 tons. It is approximately estimated that this has been disposed of in the following manner: Shipped foreign and coastwise, 400,000 tons; used at home in foundries, forges and malleable iron works, say, 600,000 tons; sent to England, 60,000 tons; in warrant stores, 200,000 tons; and remaining in makers' own yards, say, 450,000 tons—leaving a small balance for miscellaneous purposes. These figures may or may not be precisely confirmed by the official returns, which will not be available until early in January, 1879, but they are very near the exact statistics, and give a capital idea of the "way the wind has blown" during this most perilous 12 months.

The Cleveland District.

In Cleveland at the end of 1877 there were 106 furnaces blowing, or five fewer than at the same date of 1876; 56 blast furnaces idle, an increase of nine over the same period of the preceding year, and 162 built, as against 158 in 1876. The total make of pig iron in the district during 1877 reached 2,124,831 tons, as compared with 2,075,565 tons in 1876; makers' stocks on Dec. 31, 1877, were 262,067 tons, against 161,041 tons the year before; and the stock in the official warrant stores was 42,730 tons,

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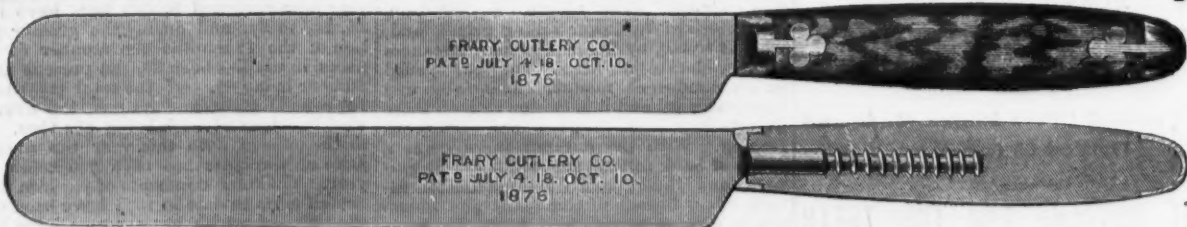
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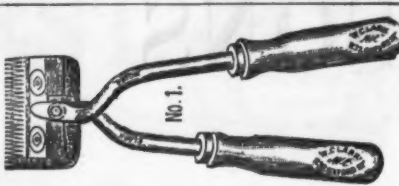
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against 21,500 tons at the end of 1876; the total stock in the district thus being 304,797 tons with which to begin the new year. The quantity of ironstone got at the various Cleveland mines during the year was about 6,252,314 tons, or 250,000 tons below the output of 1876, and the number of miners thus engaged, 9000, or nearly 1000 fewer than at the end of the year 1876. During the year 1877 the manufacture of finished iron in Cleveland reached something like 400,000 tons, of which about 200,000 tons were plates and the bulk of the balance bars and angles. In the three months ending Nov. 30, 1877, the sales were officially stated to have been 97,804 tons, at a net average selling price of £6. 10/7½ ton. Of the total 9268 tons were iron rails, 51,419 tons plates, 19,939 tons bars and 16,797 tons angles, bulbs, &c. The decline in the net average selling price during the 12 months was 7/5. During the year ship plates declined from £9. 5/ to £6. 5/, bars from £6. 7/6 to £5. 10/, angles and ship-builders' iron from £6. 17/6 to £6, and iron rails from £6. 5/ to £5. 15/. In the present year these quotations have still further descended to the extent of 10/ @ 20/ ton, and the total make to date has probably reached 360,000 tons.

The stock of pig iron now in hand in the district is estimated at about 275,000 tons. On the West coast the year opened calmly enough, the only fairly well-employed establishments being the Barrow Iron and Steel Works. The then current quotations for Maryport hematites were: No. 1, 67/6; No. 2, 65/; Nos. 3, 4, 5, mottled and white, 62/6; Bessemer No. 1, 67/6; No. 2, 65/; and No. 3, 62/6; Millom Bessemer No. 1, 70/; No. 2, 67/6; and No. 3, 65/; ordinary, Nos. 3, 4, and 5, 65/; in all cases with an allowance of 2½ off for cash. When 1878 came in there were 33 out of a total of 50 furnaces in blast in various parts of Lancashire, and 26 blowing out of 50 built in Cumberland, the aggregate production of pig iron in the two countries in 1877 having been about 1,162,345 tons. This year the output has been materially less in Lancashire, although the comparative prosperity of the Bessemer steel trade has prevented the West coast producers from feeling the depression in its full force. At the time of writing selling prices are nominally within 2/6 per ton of those last named, so that in this respect the average comes out well.

South and West Yorkshire and District.

In South and West Yorkshire 1878 opened very quietly and with poor prospects, especially in the iron trade. Current figures were: Common bars, £5. 15/ @ £5. 17/6; medium, £7; best, £8 @ £8 10/; plates, £8, and hoops, £9 @ £9 10/. These have all come down by 10/ @ 12/6 ton, as also have the pig iron brands of both localities, current figures ranging from £1. 16/ to £2. 15/ ton. Of the 48 furnaces built in January last, 30 were then blowing, and about that number have been in operation during the greater part of the year. In 1877 the production of pig iron in the whole of the West Riding was 229,027 tons, the largest number of furnaces in blast at one establishment being 7 at Low Moor. In Derbyshire 37 (of a total of 53) furnaces produced 328,203 tons of pig, but this year the output has been under 300,000 tons. In Northamptonshire this year's pig iron production has been less than the 106,948 tons made by 13 (out of 20 altogether) furnaces last year, and the ironstone mines have also been much less actively worked. Lincolnshire in 1877 had 10 furnaces, out of 21 erected, at work, and produced 116,857 tons of pig, whereas this year the average number of furnaces in blast has been fewer, and the aggregate output proportionately smaller. At Sheffield, during the present year, there has been no real improvement. Some of the current quotations at the inauguration of the period under review were: Fine cast steel for stocks, dies, and general tools, £34 @ £50; welded iron and steel, warranted, £32 @ £50; ordinary sheet steel to 20 W. G., £34 @ £50; common sheet, £24 @ £28; double sheet, £32 @ £48; single sheet, £24 @ £40; file steel, £34 @ £50; tilted blister steel, £22 @ £26; rolled blister steel, £18 @ £23; hammer steel, £26 @ £44; boring, chisel, or pump steel, £24 @ £28; rolled steel for plow plates, £16; spring steel from foreign iron, £20; ditto from English iron, £13 @ £15; best boiler drift steel, £50; blister steel, £13. 10/ @ £40; rolled Bessemer steel, £20; rolled Bessemer for piston rods, axles, &c., £16 @ £25; ditto for clock springs, £60 @ £75; Bessemer blooms, £5. 15/ @ £6. 10/; ingots, £5. 10/ @ £6; and rails about £6 @ £6. 2/6.

The heavy branches of the iron trade at Sheffield have been exceedingly quiet during the 12 months now drawing to a close, and, as a necessary sequence, the iron workers and other operatives have had their rates of remuneration lowered more than once. Much of this dullness has been caused by the comparative inactivity of the armor-plate mills, none of the leading governments, including our own, having given out large orders, owing to the uncertainty which has prevailed in respect of the merits of the various new kinds of armor which have been experimented with, not to mention the marked superiority of gunnery over the iron plates in general use. This objection still retains its force, although the most recent tests with compound iron-and-steel plates have very materially reduced the disadvantages under which defense has labored, as compared with the means of attack. Another cause of the lack of employment in these particular departments, has been the gradual substitution of steel for iron in the manufacture of ship plates and other bulky rolled articles—a change which is likely to progress, rather than be retarded, in the future. The stagnation of the coal trade has also reacted in a similar manner, by reducing the requirements of wagon builders within very narrow limits, and, again, by causing the railway companies to exercise the utmost caution in giving out orders for new rolling stock or for renewals of existing vehicles.

The older branches of the steel trade have suffered and still suffer from the restricted external demand, as well as from their own internal development. The expansion of the production has necessarily brought about a corresponding growth of competition, while

a further and most important factor in the reckoning has been the almost marvelous extent to which Bessemer material has replaced the commoner grades of crucible steel. Still another cause is to be found in the steady augmentation of the production of Siemens-Martin steel. In the manufacture of this excellent metallurgical product it may be stated there are now 16 firms engaged in this country, with a total of nearly 100 furnaces (94 on January 1 last), together with seven concerns which employ the Siemens regenerative gas furnace for melting the steel in crucibles, with a total of 534 such crucibles among them. One Sheffield house alone has 216 crucibles at work in this manner. Of the Bessemer steel industry there is a much better account to be given than of any of the heavier processes, almost the whole of the large establishments engaged therein having kept their plant in brisk operation throughout the year. At the beginning of 1878 there were 110 Bessemer converters in use in this country, varying in individual capacity from 10 tons down to 2 tons 10 cwt. each. Since that time two or three other small converters have been erected and put in operation, and others are projected in Staffordshire, where there is at present but one concern manufacturing this material. The aggregate output of this kind of steel in 1877 is not precisely stated, but could not have been far short of 1,000,000 tons—a quantity which will have been nearly or quite attained this year, notwithstanding the fact that several of the largest converters did very little during the summer months. There are, as most of our readers know, several kinds of Bessemer steel, the quality varying according to the quantity of spiegeleisen made use of and the pig iron which is used as the basis of the blowing operation. General prices, therefore, afford a poor criterion of the course of quotations, but in a general sense it may be stated that they have declined 10/ @ 15/ ton for ingots and blooms, and in a proportionate degree for other materials, as mentioned by me from time to time.

Of the hardware industries of Sheffield little can be said that is either satisfactory or novel, the whole of them having been very indifferently supplied with orders during the greater part of the period with which we are now dealing. Cutlery has had a slow sale, especially for foreign and colonial markets, and has, in not a few instances, been sold at rather lower prices. This remark applies equally to table knives, to pen and pocket goods, and to horticultural and special cutlery, as well as to razors, scissors, and the miscellaneous host of similar articles, manufactured in the old capital of the trade. As with cutlery, so with edge tools, sheep shears, electro plate, files, saws, stoves, and general foundry products. All have been influenced by the downward course of the markets, and are now, as an almost invariable rule, obtainable more cheaply than they were 12 months ago. For a few of the lighter hardware there is, at present, a moderately good sale, but the profit secured is extremely meager, and the rate of wages is based on very bare calculations. From one cause or other Sheffield appears to have suffered more seriously than most of the chief hardware centers, and at the time of writing there is an alarming amount of distress among the working classes there.

The Black Country.

In Staffordshire there were at the beginning of the present year 129 iron works, with 2000 puddling furnaces, and 342 rolling mills. It was then estimated that there were 2600 puddling furnaces idle in different parts of the country, and that there were 50,000 tons of pig iron in stock in Staffordshire alone on January 14, 1878, when the rate of puddlers' wages was reduced. The number of Staffordshire furnaces in blast at the beginning of the year was 45, out of a total of 150 built. Prices ranged then at from £2. 2/6 @ £3 ton for hot, and £4. 10/ @ £5 for cold blast; best bars, £8. 10/; medium, £7; common, £6; plates, £6. 5/ @ £6. 7/6; sheets, £7. 5/ @ £7. 10/, common, up to £11 for good and £20 for best special brands; angles, £8. 15/ @ £10. 15/; T's, £9 @ £11; rivet iron, £10. 5/ @ £11. 5/; and hoops, £8 @ £9 ton. During the present autumn, as will be remembered, marked iron was lowered £1 ton, and other qualities followed suit, having previously been disposed of at 10/ @ £1 under the quoted prices. In the North Staffordshire district there have been 23 furnaces blowing out of 35 built, and these are estimated to have made nearly 240,000 tons of pig. Last year the output reached 255,383 tons.

In South Staffordshire proper there were 57 furnaces in operation (out of 146 built) on Jan. 1, and these probably will have produced about 400,000 tons of pig by Dec. 31, as against 428,276 tons in 1877. In Shropshire 14 furnaces (of 23) last year made 102,180 tons of pig; this year their production will doubtless have been under 100,000 tons. Gloucestershire has nine blast furnaces, of which the four in use last year made 25,602 tons, a total of at least 10,000 tons in advance of this year. In Wiltshire there are seven furnaces, of which two have been in general use; in Hampshire one furnace, and in Somersetshire one (which has been idle), their aggregate production being set down at about 20,000 tons of pig. In South Staffordshire generally, and the districts which are mostly spoken of as being subsidiary to it, the whole of 1878 has been stagnant and unsatisfactory to the ironmasters and hardware manufacturers, not a few of whom have been compelled to suspend operations, either voluntarily or owing to the pressure of their creditors.

In the nail and certain other trades indigenous to the Black Country, labor disputes have further complicated matters, but the men have almost universally had to bow to the inevitable, and are now working for less money than they were receiving at this time last year. This remark also applies to Birmingham, which is virtually not merely part and parcel, but the capital, of all the surrounding districts. The great hardware center, nevertheless, has suffered much less than some of its principal competitors, the majority of the chief concerns having managed to keep fairly well employed throughout the greater part of the year. This favorable result may, in a sense,

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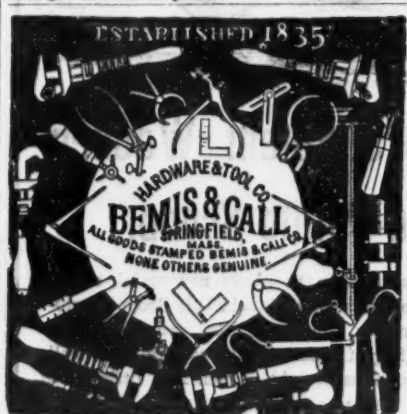
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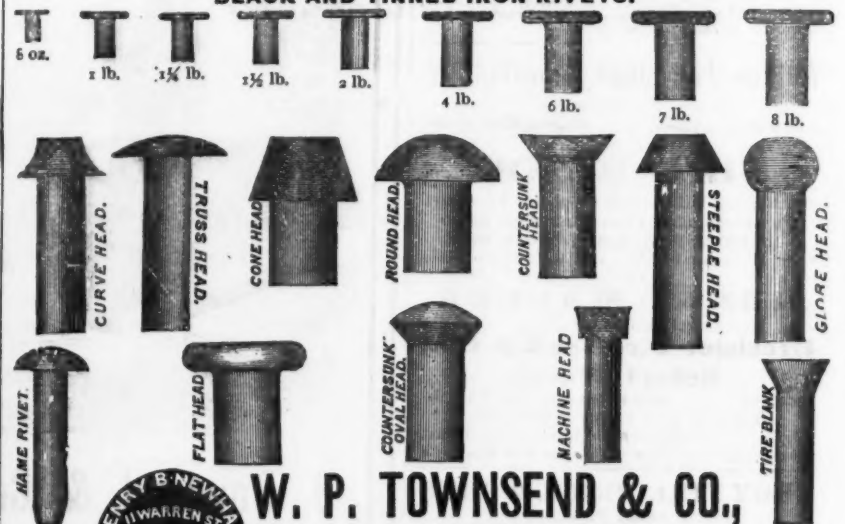
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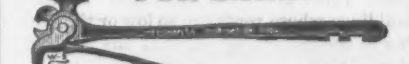
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be attributed to the great variety of businesses carried on at and about Birmingham, to the increased use of machinery, and to the energy and enterprise with which the manufacturers have forced their way into new markets, as well as to the adaptations of new patterns they have made, in order to endeavor to stem the current of American and other outside competition. No doubt profits have, in most instances, been meager; yet the fact remains, and stands forth to the great credit of the town, that there is to-day less suffering, and a smaller number of unemployed workpeople there, than at any other large town where iron or hardware is the staple trade. It is, no doubt, true that there has been a hard and unbroken struggle all the year through; but the fight has been carried on unflinchingly, and with much more success than could have been predicted some time back. Some of the local industries commenced the year badly, but have experienced a certain revival since, while others have fallen away from the promise they bore on the advent of the present year of grace. The good, however, has almost wholly counterbalanced the evil, and, as things now stand, "Old Brum" is in a better position than most of her neighbors. In all departments where sheet or other iron is largely worked up, prices have come down since last Christmas. Indeed, in pretty nearly every branch strenuous efforts have been made for the purpose of cheapening the finished article, so as to stimulate buyers. To enumerate all the changes of this class would be to attempt an impossibility, not to mention the fact that everything of material interest to the trade has been fully and fairly chronicled in my weekly letter to this journal.

Wales and Monmouthshire.

In North Wales the total existing number of blast furnaces is 11, of which three have been in operation during a great part of the year, the product being estimated at about 24,000 to 25,000 tons of pig, as against 26,715 last year. In South Wales there are 89 furnaces built and about 27 or 28 only at work, the production being set down at about 300,000 tons of pig for the whole of the year, as compared with 342,478 tons in 1877. Of the aggregate number of blast furnaces in South Wales, 13 are constructed to use anthracite coal, but only three or four of these are in use. In Monmouthshire, out of 61 furnaces erected there have been about 30 blowing during most of the year, with a production which will probably reach a little over 300,000 tons, as against 368,480 tons in 1877. The iron trade, however, of South Wales and Monmouthshire is clearly in its decadence (as is shown by the foregoing statistics), but it is most satisfactory to note that much of that which is lost in that sense is regained in another, there being now at least four large Bessemer steel concerns, besides the Londore-Siemens and other works for the production of the newer materials. Whether, as Mr. Crawshaw is reported to believe, another period of good trade would bring a renewed demand for iron rails, or otherwise, it is scarcely possible to predict, but it is, in the meantime, gratifying that the metallurgists of the principality and its nearest neighbor are marching with the times, in preference to following the notorious policy of Mr. Micauber. In one notable particular there has lately been a marked change for the better, that is, in respect of the tin-plate industry, in which a judiciously arranged and firmly carried out policy has at length given a fillip to business and an upward course to prices. This had been attempted on previous occasions, but without success until the present movement, which embodied its policy of restriction last month, and has since carried it out steadily and successfully.

There are 75 tin-plate making concerns in this country, with a total of 261 mills, of which there were 211 in going order at the beginning of this year. The aggregate output of tin,terne, and black plates per annum is believed to be nearly or quite 4,500,000 boxes, of which we export nearly 3,000,000 boxes (of which two-thirds go to the United States), besides about 43,000 boxes of Canada plates, the whole of the latter being shipped from Liverpool. Next to the United States, our best customers for tin plates are British North America, Australia, France and Switzerland, India and China, Holland, Germany and Belgium, and the large Mediterranean countries. Prior to the inauguration of the restriction policy referred to above, prices of all kinds of tin plates had sunk to an altogether unprecedented level, ordinary cokes being sold at 13/ @ 13/6 per box, and charcoals at equally ruinous (to the manufacturers) rates. Already, however, an improvement of 1/ @ 1/6 per box has been effected, and the demand is so well sustained that further upward alterations may be looked forward to. The manufacturers are, after much tribulation and the manifold bad consequences of dissociation and so-called independent action, well knit together in an association, and seem likely to be able to carry out their plans to the fruition they desire. Among other noteworthy changes recently introduced by them, may be noted the determination to re-establish quarterly meetings, at which they can report progress and feel the pulse of the trade.

The Rail Trade.

The rail trade opened in a better condition than it had been during a great part of 1877, and has remained moderately well engaged all the year. During 1877 we exported rather over 400,000 tons of rails—about two-thirds being steel—and used at home something under that quantity. The price of iron rails declined from £5. 5/ @ £5. 10/ to about £4. 12/6 @ £4. 17/6 per ton during 1876, and steel from £6. 12/6 to about £6. During the present year these quotations have each been further reduced by from 7/6 to 15/ per ton, by making which changes the principal manufacturers have been enabled to "keep moving," and have, at the present time, their order books so satisfactorily filled on home, foreign and colonial account, that they are assured of work for some months ahead.

Something entirely new in the passenger engine line has just been turned out at the depot machine shops of the Reading Company, at this point. The engine is built to

pull passenger trains, and is an anthracite waste fuel burner. Heretofore Mr. Wooten's patent has been applied only to engines for coal and freight trains, and its application to passenger engines is a step forward. The locomotive presents a strange and novel sight. Instead of the cab being at one end, it seems to be in the middle. About 5 feet of boiler can be seen in front, and about the same length of flat fire-box in the rear. The cab is immediately above the main drivers. The furnace is built long and flat, with a view of obtaining as much heating surface as possible, to enable them to generate steam by slow firing. The engine will be tried on the road to-day, and then taken into the shops to receive her trimmings and finishing touches.—Reading (Pa.) Eagle.

Scientific and Technical Notes.

It appears that the system of

UNDERGROUND CABLES,

first tried some time since between Berlin and Cologne, in Germany, is fast gaining ground in that country. According to the *Deutsche Industrie Zeitung*, 1279 miles are now finished, the lines being Berlin, Halle, Frankfurt, Strassburg; Halle, Leipzig; Berlin, Magdeburg, Cologne; Cologne, Barmen; Berlin, Hamburg, Kiel. Within a short time this is to be increased to 10,018 miles.

In an article contributed to the *Revista Marittima*, Signor A. Lettieri has described an apparatus for the

DETERMINATION OF THE RESISTANCE OFFERED TO SHIPS,

by experiments on their models. In experiments of this nature, the elements to be determined are two—the uniform velocity and the resistance encountered at that velocity. The first of these is obtained by the measure of the space passed through in a unit of time. It is, therefore, desirable to have an apparatus which shall graphically denote this velocity by a curve, and refer it to a measure of the resistance. To effect this, Signor Lettieri has designed a vertical cylinder (the drawing shows the length to be 14 times the diameter, but neither scale nor dimensions are given), which revolves on a fixed axis. The upper part of this axis sustains a pulley, and a second pulley is fixed beneath the cylinder, with a small drum on its axis. A line attached to the drum passes over the upper pulley and sustains a scale pan, to which is fixed a pencil, the point of which presses against the cylinder. The model is attached by a line to the lower pulley, so that the descent of the weight corresponds to the movement of the model through the water, while the weight itself is a measure of the resistance. Movement is given to the vertical cylinder by means of a pair of conically toothed wheels, one of which is attached to the cylinder itself. The motion of the latter being made thus uniform, and its velocity known, the curve traced on it by the pencil will indicate the relation between the movement of the model and that of the cylinder, and will form a regular spiral when both movements are uniform. The remainder of the paper is occupied by an algebraical investigation of the curves thus to be obtained, and by the relation between the weight placed in the scale pan and the resistance encountered by the model in its passage through the water.

The *Chemiker Zeitung* contains a description of a

METHOD OF TESTING DYNAMITE.

The percentage of nitroglycerine is determined by extracting it with ether, which dissolves it, but leaves the infusorial earth unchanged. The difference in weight of the dynamite and of the infusorial residue, directly yields the percentage of nitro-glycerine. In order to ascertain whether the dynamite contains any other bodies soluble in ether, the ether extract is diluted with water, which precipitates any foreign substances present.

One of the most interesting attempts to

INDICATE DANGEROUS ACCUMULATIONS OF FIRE DAMP,

is J. Coquillion's *grismètre*, an apparatus the action of which was based upon the decomposition of hydrocarbons by a red-hot palladium wire, in presence of steam. This reaction he used for the analysis of the air of the mine. He has now found that he can replace the palladium by platinum, by the use of which the disadvantage that the Planté pile cannot be employed, is overcome. Recent researches of M. Coquillion have shown that the bicarbide of hydrogen detonates more violently than the monocarbide, that palladium produces a smaller detonation than the platinum, and that both metals can burn small quantities of gas. Mr. Coquillion has accordingly replaced the former by the latter metal in his portable apparatus.

The *National Car Builder* states that a trial will soon be made with a

NEW ELECTRIC CAR SIGNAL,

recently patented by J. A. Sherman and C. E. Mees, of Louisville, Ky. The invention consists in combining a signal device upon the locomotive, with two conducting wires extending through the cars of the train, and terminating at the end of each car in adjacent contact plates, forming seats, together with a flexible cable, having two insulated wires terminating in metal plates, separated by a soft rubber block, to continue the circuit, but permitting it to be broken when the cars separate and transmit a signal to that effect to the engineer. It can be applied to freight as well as passenger cars. The cost will be something more than that of the system now generally in use.

In *La Nature* we find the description of a

POCKET MICROPHONE,

invented by Trouvé. It resembles a small dark lantern, with a carbon crayon substituted. Even when a person speaking stands from 75 to 100 feet from the microphone, it transmits his voice very well to a receiving telephone. The instrument can be used for revealing the movement of the heart or lungs.

The Iron Age

AND
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by them, free of charge, to any firm engaged in the
trades we represent in Australia, Tasmania and New
Zealand.

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Hardware and Metal Prices.

Whatever may come of the excursion of
manufacturers and merchants to Mexico in
the shape of actual business, it will not be
without many and good results, and we
congratulate those who are so fortunate as
to be of the party. They will learn much of
the country, of the people, and of the condi-
tions there existing which are favorable or
unfavorable to American trade. The party
will unquestionably have a roaring good
time. The abounding hospitality of the
Mexicans will insure them a most hospitable
reception, and the programme of excursions,
receptions, balls, banquets, bull fights and
sight-seeing generally, has been made with
evident forethought, for there are at least
two brief intervals of rest, which, we
should say, will be found very necessary.
It is not probable, however, that all who go
will come home with nothing better to show
for their visit than dinner cards and orders
of dancing. There are many shrewd, prac-
tical, observing, enterprising business men

in the party, who will not fail to learn a
great deal. They will find German competi-
tion exceedingly strong in Mexico, and Ger-
man trade well entrenched in all the prin-
cipal Mexican cities; but then the Germans
do not make American goods, and perhaps
we shall find a way to make a better mar-
ket there than now exists.

Specie Payments.

The fact that the resumption of specie
payments by the Treasury has been ap-
proached without disturbance, and attained
not only without shock, but without causing
even a ripple of excitement in business
circles, should teach the gloomy prophets of
evil, who predicted that resumption would
be attended with widespread disaster, that
it is not safe to be too confident, nor ex-
pedient to take a gloomy view of what a
majority of the people consider desirable.
It is possible that the occasional chance to
cry "I told you so," compensates them for
many disappointments in the non-fulfillment
of their prophecies; but, in this case, they
cannot have even this poor satisfaction.
When the time fixed for resumption drew
near, business of all kinds quietly and nat-
urally adjusted itself to the new basis, and
specie payments were an accomplished fact
in the general and financial markets, weeks
before the date at which the Treasury was
by law required to redeem in gold such of
its demand notes as might be presented for
redemption. The idea that resumption
would be impossible until the Treasury held
a dollar in gold for every dollar of outstand-
ing greenback circulation, was always mani-
festly an absurdity. It presumed that the
people wanted gold, and did not want paper
money. Exactly the reverse of this is
true. What the people wanted was simply
to have their paper money so appreciated in
value that it should be at par with gold.
When this point was reached, there was
obviously no inducement to make the ex-
change.

Owing to a variety of causes, some ac-
cidental and some the result of good man-
agement, gold has accumulated in the Treasury
to a far greater extent than was generally
expected; but, inasmuch as it was not a
constrained concentration of coin, its accu-
mulation has not been attended with any
stringency in the financial markets. How-
ever, it has given the Treasury some \$225,-
000,000 of coin, of which about \$180,000,000
are available for specie resumption. This
percentage of coin reserve is less than is
considered necessary by the Bank of Eng-
land or the Bank of France, but it is ample
under the circumstances, and the Treasury
Department can safely defy all attempts to
seriously impair it. The department was
right in assuming that the people would
neither need nor desire gold when it could
be had in exchange for greenbacks at par;
and while a large coin reserve may be needed
to inspire the public with full confidence in
the sincerity of the offer to redeem outstand-
ing Treasury notes, it is practically much
greater than was needed to afford a safe
basis for resumption.

Looking back over the past 17 years, we
find good cause for congratulation that the
consequences of a depreciated paper cur-
rency have not been more permanently
serious than they were, and it would take
more than argument to reconcile the busi-
ness community to the idea of again pass-
ing through this dangerous maelstrom of
speculative excitement. Once more on
solid ground, contracts of all kinds have
a definite basis, which they never could
have when the value of the currency of
commerce was subject to sudden and vio-
lent fluctuations. Commerce is no longer
handicapped by the absence of fixed stan-
dards for the importer and the exporter,
and there no longer exists the temptation to
reckless speculation which a few years ago
demoralized all departments of trade. There
are, doubtless, many who regret that these
conditions do not now exist, and who at-
tribute all our misfortunes, not to the evils
of inflation, but to the methods adopted for
the correction of those evils. As well might
the wasted, but convalescent, fever patient
long for the wild dreams of the delirium
through which he has passed. Fortunately,
but few business men feel this way. The
fact is generally recognized that health and
soundness are desirable at any cost—even at
the great cost we have been called upon to
bear. The panic, the widespread disaster,
and the protracted depression, were neces-
sary steps toward convalescence. They
must have come sooner or later, and no ar-
tificial stimulants in the shape of new issues,
or efforts to float the old and sustain for-
mer valuations, could have long averted
them. Now that they are past, and we
have touched solid ground again, he must
be wild indeed who longs for another bal-
loon flight, or who would favor inflation,
with attendant depreciation of the currency
—either paper or debased silver coin—as a
means of stimulating trade and increasing
the national prosperity. There is, so far as
can now be seen, but one cause which
threatens the disappointment of the confi-
dent hopes of substantial recovery enter-
tained by the business community. This
is the uncertainty with regard to the
future value of silver. Should a great
amount of legal-tender dollars be coined,
and the value of silver bullion remain de-
preciated, it is not improbable that United
States notes, redeemable in silver as well as
gold, would follow the downward course of
the depreciated metal and drop below the
par of gold. As this would again entail the

serious evils of a fluctuating currency, it is
to be hoped that Congress will anticipate the
difficulty by limiting, or stopping, the further
coinage of silver until the value of this
metal is definitely determined.

That resumption is not the last straw to
break the backs of industry and trade is
already evident, but it is not to be supposed
that the prophets of evil will be silenced.
They will say: "Yes, we have got down to
specie payments, but what are the conse-
quences of the suicidal policy? Industry
is paralyzed, trade is ruined, thousands
have drifted into bankruptcy, capital has
shrunk and shriveled, and all that remains
of our prosperity of two years ago is a
memory." This is consistent and sounds
impressive, but are we sure it is quite in
accordance with the facts of the case? The
close of the year was awaited with anxiety,
but it was attended with an unusually small
number of failures. The prediction of a
good business during 1879 is on the lips of
nearly every manufacturer and merchant,
and this faith is vindicated by the prepara-
tions now making for the spring trade.
The industries of the country are already
feeling the stimulus of a steadily increasing
consumptive demand. Railroad accounts
show increased earnings, and increasing
exports are demanding new lines of steam
service from the principal cities of our At-
lantic seaboard. Our foreign trade is in a
satisfactory condition, with steadily im-
proving prospects as regards the foreign
market for our manufactures. All classes
are adjusting themselves to the changed
conditions, and those who have felt most
heavily the decline in wages, appreciate most
fully the increased purchasing power of
currency. In a word, the situation is re-
markably favorable, from whatever stand-
point it is viewed, and while a return of the
conditions existing prior to 1873 is neither
possible nor desirable, there is no apparent
reason, except the 412½-grain silver dollar,
why this nation, rich in resources and strong
in proven credit, should not experience a
regular, healthy and sustained development
for many years to come. The new year is
full of cheering promise.

Heating Cities by Steam.

In a recent issue we mentioned at some
length General Spinola's steam-heating
scheme, together with the fact that he had
obtained the necessary permission to try it
in this city. A small district some-
where on the river front, we under-
stand, is to be used for the purpose of
demonstrating the value of the plan. It is
not understood that the Holly system alone
is to have the exclusive opportunity to lay
pipes here. If this system is successful,
other systems will be allowed to compete.
Ex-Mayor Ely says the company will not
be allowed to take up paving, &c., without
giving bonds to insure the proper filling of
trenches and repaving of the streets. The
grant is much less comprehensive in its
character than was at first supposed, and it
would seem that the franchise is yet to be
disposed of. How valuable this will be can
best be understood from an examination of
the opinions and claims of General Spinola.
The first point is made in regard to the
economy in carting away ashes. With respect
to this he says: "It costs the city now, so
I am informed by the police, \$225,000 a
year to carry away ashes from in front of
residences in this city. Now, if this sys-
tem of ours is universally adopted, there
will be one item of economy, for there will
be no ashes to cart off."

This statement we think altogether too
broad. While we have not the figures at
hand to verify it we cannot say positively,
but we believe that a part of the expense
mentioned is chargeable to the removal
of garbage. A universal adoption of
steam heating is manifestly impossible, nor
do we think it altogether desirable or
economical in all cases. In a large build-
ing, where from 50 to 100 horse-power
boilers are needed, steam can be as cheaply
produced on the premises as by the Holly
system. Hence there will be more or less
ashes always, and the expenses of removal
will to some extent fall upon the city. The
next point made is a reduction of cost in
the heating of the public buildings of
the city, from \$600,000 to \$200,000. This
includes station-houses, police stations, &c.
The figures seem large, but we should not be
surprised if a reduction of one-half were
possible. The present system is very waste-
ful.

It is urged that a saving of one per cent.
can be effected in insurance, and that in the
case of private houses half the cost of the
fuel will be saved. Both these claims seem
somewhat extravagant, yet by strict econ-
omy the company may be able to effect a
great reduction in the cost of warming.
The waste of fuel by our present methods of
heating is something enormous, and until
coal is much higher in price than it is now,
no saving of any considerable value can be
accomplished by the ordinary methods of
consumption that will not cost more than it
is worth. In the heating of private houses,
then, we must expect not only the greater
proportion of customers, but the greatest
economy. The system will also have a
great value for small flats and for those
buildings whose rents are so low or the num-
ber of occupants so small that the introduc-
tion of steam would not now pay.

The cost of attendance, danger and an-
noyance of the boilers are some of the chief
reasons why this system of heating is not
more generally adopted. When we take

these away, the field for steam using is vastly
increased. What results may follow in the
way of changes in habits of living, cooking,
the plumbing of houses and the general do-
mestic economy from its general introduc-
tion, it is difficult, if not impossible, now to
imagine. It is evident, however, that a
revolution of the most sweeping character
is likely to follow. For example, in plumb-
ing work we may expect a steam, instead of
a hot-water system. And we may find water
heated by blowing steam into the bath tub,
instead of being heated in a boiler. The
plumbing, or rather the steam fitting, will be
in some respects peculiar, for if the conduct-
ing pipes are not protected from radiation
in the most careful manner, great inconve-
nience may result in warm weather.

Although no trouble has been experienced
in Lockport, as yet, from the bursting of
mains, it is not to be expected that a long
and complicated network of steam pipes can
be laid in the streets without eventually giv-
ing trouble. The bursting of a large steam
main under a pressure of 200 pounds per
square inch, is not a pleasant accident to con-
template. In case such a burst ruptured a
sewer, very serious damage to houses in the
vicinity might occur. The precise charac-
ter of the accidents possible with this system
cannot, however, be predicted with any cer-
tainty, for the reason that we know so little
of the behavior of steam under such condi-
tions. Should a burst occur in cold weather,
no doubt much inconvenience would follow
to those houses on the immediate section
of pipe where the accident happened. By a
double system of supply this can be
largely avoided, but at an increased cost.

We are not altogether pleased with the
method in which the details of Mr. Holly's
system have been worked out. They seem
in many instances more ingenious than me-
chanical. The plan of wire drawing the
steam so that the pressure within the house
shall be only three or four pounds while the
pressure in the pipes is 200, does not impress
us favorably. It would seem that the re-
sulting loss will be serious. In the measure-
ment of steam there appears to be room for
serious error. There is, so far as we can
understand the operation of the meter, no
means of insuring dry steam; and should
the boiler prime considerably, a serious loss
to the consumer would result therefrom.
Much stress is laid upon the abundance of
hot water which the system will furnish, but
it will be rather expensive heating if the hot
water has to be paid for at the same price
as the steam—that is, if wet steam, passing
through the meter, costs just as much as
dry steam. Separators can doubtless be
used which will give steam reasonably dry,
but if the company has to suffer this loss,
they may find it a very considerable tax
upon them. The experiment at Lockport,
although satisfactory in some respects, does
not give any hint of what the actual loss by
condensation amounted to. Gen. Spinola
claims that the protection is so complete
that little or no condensation takes place
within the street mains. This can hardly
be the case, as the covering described, al-
though a very good one, does not seem to
be by any means perfect. Careful experi-
ments must be made with the experimental
works before the remarkable statements
which have been made can be accepted with
confidence by the public.

Gold and Silver.

The annual statement of Wells, Fargo &
Co. shows that, during 1878, there was an im-
portant falling off in the gold and silver pro-
duction of the United States. The produc-
tion of both metals in the States and Terri-
tories is given as follows, for 1877 and 1878:

| | 1877. | 1878. |
|----------------------------|--------------|--------------|
| California..... | \$18,920,461 | \$18,174,716 |
| Nevada..... | 35,181,949 | 31,580,200 |
| Oregon..... | 1,213,724 | 1,191,997 |
| Washington..... | 73,311 | 92,226 |
| Idaho..... | 1,808,122 | 1,839,495 |
| Montana..... | 3,753,640 | 2,644,912 |
| Utah..... | 6,064,613 | 8,113,755 |
| Colorado..... | 6,232,747 | 7,913,549 |
| New Mexico..... | 423,813 | 379,010 |
| Arizona..... | 2,267,683 | 2,386,622 |
| Dakota..... | 2,215,504 | 1,500,000 |
| Total..... | \$78,276,167 | \$95,811,573 |
| Deduct lead..... | 3,432,000 | 5,085,250 |
| Total gold and silver..... | \$74,844,167 | \$90,726,323 |
| Mexico, W. Coast..... | \$1,594,995 | \$1,432,992 |
| Br. Columbia..... | 1,283,400 | 1,177,190 |
| Total..... | \$77,722,562 | \$93,336,505 |

The following statement shows the pro-
duct of lead, silver and gold since 1870:

| | Lead. | Silver. | Gold. | Total. |
|-----------|-------------|--------------|--------------|--------------|
| 1870..... | \$1,000,000 | \$17,320,000 | \$33,750,000 | \$52,150,000 |
| 1871..... | 2,100,000 | 19,260,000 | 34,390,000 | 55,750,000 |
| 1872..... | 2,250,000 | 19,024,499 | 34,100,195 | 55,374,694 |
| 1873..... | 3,450,000 | 27,483,208 | 39,200,538 | 70,133,800 |
| 1874..... | 3,800,000 | 29,599,127 | 38,466,488 | 71,865,615 |
| 1875..... | 5,100,000 | 31,635,239 | 39,968,194 | 76,703,433 |
| 1876..... | 5,040,000 | 39,292,924 | 49,886,935 | 94,220,859 |
| 1877..... | 5,085,250 | 45,846,100 | 44,880,223 | 95,811,573 |
| 1878..... | | | | 78,276,167 |

Although the items which make up the
total of \$78,276,167 are not given for 1878,
it is probable that the silver and gold pro-
duction was about \$37,000,000 each. The
falling off in silver is due in a great degree
to the lessened production of the Comstock
lode—\$37,911,710 in 1877, and \$21,295,043 in
1878.

Both Belgium and Sweden are suffering
more or less severely from depression in
business. The iron industries of these
countries are much affected, and in Belgium
there is great distress among the working
classes. In Sweden the peasantry are said
to be in a pitiable plight. There have been
several important bank failures in Stock-
holm, which have ruined many of the great
landed proprietors, or *Bruggpatrons*. In
both countries the immediate outlook is far
from encouraging.

The Martin Patents in the United States.

We have the following letter from Messrs.
Cooper, Hewitt & Co., relative to the Mar-
tin patents, under which they are granting
licenses for the manufacture of open-hearth
steel:

NEW YORK, Jan. 2, 1879.

To the Editor of *The Iron Age*—Sir: As the ar-
ticle in your columns of to-day's date, "The Si-
emens-Martin Discussion," might be construed in a
sense injurious to the rights, in this country, of the
Messrs. Martin, whose agents we are, we take oc-
casion to say that nothing in the correspondence of
Dr. Siemens with the French company adminis-
tering the Martin (French) patents, and nothing in
the resolutions of Prof. Turner, which you quote,
affects the claims of the American patent, under
which we are granting licenses for the manufac-
ture of open-hearth steel, since these claims are
not referred to in the said correspondence or resolu-
tions.

Yours, respectfully,

COOPER, HEWITT & CO.

We scarcely think that anything in our
article of January 2d could be fairly con-
strued as injurious to any one interested in
the Martin patents in this country. The
facts of the Siemens-Martin discussion, and
the action of the Berg u. Hüttenmaennische
Verein für Steiermark u. Kärnten thereon,
were matters which the American iron
trade have a perfect right to know all
about, and no one will question their right
to determine whether the causes which
make the Martin patents worthless in
France, affect the value of the American
patent. No man wants to pay royalties or
buy licenses unless he must, and Messrs.
Cooper, Hewitt & Co. would be the last to
demand such payment unjustly, or to desire
the concealment of any information of in-
terest to licensees. We print their letter
with great pleasure, feeling sure it will in-
terest all who use the open hearth pro-
cess in this country, whether they found
anything in our previous article to interest
them or not.

Contraction of English Credits, and the Effect on American Trade.

To sustain in full volume the great export
movement in our foreign trade, demands
ceaseless vigilance. Secretary Sherman's
recent circular bearing on this topic, though
somewhat general, and perhaps a trifle am-
biguous, probably has a significance not
fully understood at first. The special fact
to be observed is the far-reaching effects of
the present financial convulsion in England—
how immediately it cripples the resources of
our foreign customers the world over. The
head of one of our most prominent mercan-
tile firms, largely engaged in the export
trade and doing a heavy commission busi-
ness, speaks of the need of excessive caution.
Through London they learn that business
firms in South America are almost paralyzed
by the sudden contraction of credits, which
English manufacturers are compelled to en-
force. As a case in point, it is mentioned
that four importing houses in Rio de Janeiro
charged off, in the month of September, no
less than \$1,500,000 of losses, all of recent
occurrence in their business, directly at-
tributable to the reaction thus brought
about. It is common among traders who re-
plenish their stocks in England, to get nine
months' credit and an extension of say six
months more by paying 2½ per cent., so
that the man in Rio, for instance, who re-
ceives 10 per cent. profit from his local cus-
tomer, can go on indefinitely and prosper.
It is notorious that most of the cash pur-
chases made in the United States by mer-
chants from abroad, have been on the
strength of credits thus obtained. We hear
it intimated, therefore, pending the adjust-
ment of difficulties in England, that our ex-
porting merchants will, if wise, not rely on
the expectation of remittances "on receipt
of documents" by foreign clients, lest the
latter find themselves without ability to
comply. The English joint stock banks, in
competing for business, extended the credit
system beyond all bounds, and at last pay
day has come.

The establishment of a new steam line
from New York for freights exclusively,
under the auspices of the New York Central
Railroad Company, is an event of im-
portance. The service will be to Liverpool,
Hamburg, Antwerp, Havre and such other
ports as cargoes may be obtained for. Al-
ready 14 iron screw steamships have been
chartered, some of which have arrived,
and others are now on the way to
New York. It is further stated that
the Central Railroad Company will charge
neither wharfage nor elevator fees, making
a large saving over other cities and steam-
ship lines in the cost of transportation. This
may hurt competing cities, but it will be to
the interest of Western producers and for-
warders, as well as to New York exporters.

The death of Morton McMichael, of Phila-
delphia, will be widely regretted. For many
years he has been prominently before the
public as a journalist, a politician, and an
enterprising, public-spirited citizen. In
every walk of life he has won and retained
the confidence and respect of all classes, and
his death, at a ripe old age, ends a life of
great activity and usefulness.

A Year's Failures in Great Britain.
—The number of business failures officially
announced in the Kingdom of Great Britain
and Ireland during the year 1878, has been
15,059, of which 2643 were in the financial
and wholesale and manufacturing branches
of trade, and 12,416 in retail trades, profes-

sional pursuits, builders, publicans, working classes, &c., against 2172 and 8850 under the respective headings in 1877, showing an increase of 4037 failures last year over the preceding year.

Grips for Testing Metals.

To the Editor of The Iron Age—DEAR SIR: Being earnestly engaged in the manufacture of testing machines, which is now pretty generally known, anything concerning the testing of material of any kind attracts our attention immediately, wherever seen. The interesting and able paper of Mr. Percival Roberts, in your excellent journal of Dec. 5 (page 15), did not, therefore, escape our notice, especially as our name appeared in it. We naturally looked to see whether it was there for praise or censure. It happened to be for both. With the first we were, of course, very much pleased; with the latter we felt we were condemned without just cause, or at least the fault he finds is not our fault, and we hasten to explain, both to our good friend and the public generally, who have heard and read his article.

We are fully aware that the wedge-gripping apparatus he refers to, is not the best method of holding or grasping specimens in testing, and we would not make them if not compelled to by the purchaser, who demands cheap methods. Everyone knows who has had much to do with testing, that to make "headed" specimens is a very expensive thing, especially when a great number of tests are made daily or weekly, and the manufacturers would have to be contented with but few comparisons, instead of the many that can be made by using the wedge grip, and placing therein pieces cut from the bar without any preparation whatever.

Now, although we admit that the holding tools requiring the "headed" specimens are no doubt the best, still, we are not prepared to condemn the wedge grips as unfit for use, for they are almost indispensable in some cases for band iron, wire, leather and many other pliable articles. In testing wrought iron, whether round or square, they answer their purpose well, and in our opinion, and in the opinion of many experts with whom we have conversed upon the subject, the difference is not very great, if at all noteworthy. If the machine is so constructed as to give a straight pull, as ours are made to do, and the wedges and specimen placed properly, a reliable test can be made.

It is our intention, at some future time, to make a series of experimental tests of specimens prepared in different ways, which will give us the desired information. Brittle metals require the greatest care in preparation—the least side strain affects them—ductile metals like iron, brass or lead, accommodate themselves to any slight deviation from a straight line at first. The mere settling of the ends of specimens in the grips and the alignment of the apparatus, are not sufficient to tax the piece unfairly, or detract from its limit of elasticity (the safe strength of material used in bridge building, &c.).

We would take the opportunity to mention that we are now building a machine for the Pennsylvania Railroad Company, which will have tools for testing in various ways, which goes to show that we only want the orders to make holders to suit any taste, and that we are not wedded to the wedge-grip system, but have only adopted it because we could not find a cheaper or better way to hold specimens to suit the purchaser. The machine in question is one of our latest improved—a design of our superintendent—and is worth examining. It will be on inspection for a few days, and all who are interested in such things are invited to inspect it at our works, Ninth street, above Master.

This machine is capable of testing specimens of any material, up to 50 tons. It is constructed to work by hand or power, has hydraulic pump and screw arrangement, for holding strain for any length of time. The pumps have three plungers, with variable stroke and under instant control. It has a wide range for experimenting, will take in specimens for tensile strain from 1 to 4 feet, crushing 4 feet, and transverse from 12 inches to any desired length. We believe it will be the most complete machine to be found anywhere. We are prepared to contract for machines as large as wanted—a million pounds or more—and are willing to undertake its completion in a given time. Ten years' experience (it is that time since we first began to manufacture testing machines and to agitate the subject extensively, through the press and privately) has given us an advantage, we think.

One word more about the wedge grips. With all their faults they have been of great use, so much so that without them a great amount of information would have been deferred indefinitely. The one item of boiler-plate inspection has been of great importance, although the wedge is the worst form for holding plate; yet if placed in the machine with great care, by relieving the edges and having the center a little higher, a very fair and reliable test results. Our first machines were provided with a holder, with bolts, nuts and side sleeves, giving a perfectly straight pull, but specimens had to be made larger at each end, with holes in them, and it took so much material and drilling, that they were sent back and exchanged for the wedge grips.

Hoping we have fully explained our position, and we are, very respectfully,
PHILADELPHIA. REHLE BROS.

The Chinese Treaty Question.—The Chinese immigration question was discussed at the Cabinet meeting on the 3d inst., and resulted in its reference to the Secretary of State for correspondence with the Chinese Embassy, with a view to the modification of the Burlingame treaty. It is understood that there is a division of sentiment in the Cabinet upon this question, some members favoring the abrogation of the treaty, and others favoring modifications by which the number of immigrants from China may be limited. It is known that the Chinese government will resist any offer to modify the treaty, but will not formally object to its abrogation should the United States insist upon that course. The Burlingame treaty contains no provision for its abrogation, but should this government decide to ignore it,

the Chinese government would be forced to acquiesce.

History of the Steam Engine.

II.

During the latter half of the last century, the modern steam engine may be said to have reached its present forms. The cylinder and piston, with the piston rod and crank, were then well known, and used practically as they are to-day. The low-pressure engine had received the separate condenser in its present form, and although not until the atmospheric engine was used for producing a rotary motion, was applied to the work of turning a shaft. The number of engineers and inventors who were then busy with the problem of producing power by the use of steam, was very large. The success which they attained was not, in general, at all in proportion to the value of their mechanical achievements, but depended entirely upon the individual market which presented itself to them. In America there were several attempts at engine building for various purposes. All of them, so far as the engines were concerned, seem to have been successful. One of the earliest was that of William Henry, who built a steamer at Lancaster, Pa., in 1763, after his return from England. In commenting upon this, Professor Thurston says his attention was called to Watt's invention, which was at that time the theme of discussion in all circles; and, although he does not say it in so many words, leaves the reader to suppose that Henry obtained his ideas from seeing or hearing of Watt's engines. When we come to compare dates, we think this is entirely a mistake, for so far as we can gather from the dates given by Professor Thurston's book, Watt did not make his experiments and invention of the separate condenser until 1767,* and his first experimental engine, with its 6-inch cylinder, was not completed until 1765, some two years after Mr. Henry built and set his engine at work, at Lancaster, Pa. So far as we can see, Mr. Henry's title to fame as the originator, or father, of the steam engine, is as good as that of Watt. It was not until 1768 that an engine was built which worked well enough to make Boulton & Watt think it worth while to take out a patent.

Henry's engine was put into a boat, and drove a pair of paddle-wheels. This engine, like those of Rumsey, James Fitch and Oliver Evans, seems to have been of the high-pressure class. The boldness and originality of the American mind was strikingly displayed in the way in which these early inventors attacked the problem of utilizing steam, and in every instance they chose to make use of its elasticity, and employed pressures which would be considered respectable practice at the present day.

Oliver Evans attempted to supply an engine suitable for propelling vessels on our inland waters. He was, it seems, much in advance of his time; and, although his engine could have been successfully used for this purpose, and was so used in one or two instances, there was no demand for steamers, since there was nothing for them to do.

There was, however, a great need for power to drive grist mills, and his engines found a ready sale for this purpose. Indeed, it is a matter of history, that one of his engines, intended for a boat on the Mississippi, and sent to New Orleans, was put to work at sawing lumber while the boat was building. It was very successful at this, and was never set afloat. But the demand for mill engines was limited, hence Evans never attained the success of some other engine builders. Evans worked on a somewhat original plan. He did not attempt to make use of the atmospheric pressure, nor of a vacuum, but boldly employed the elasticity of steam, and worked with pressures which, as we have said, would be considered respectable at the present day. In England, a number of inventors struggled with the problem of the steam engine, both high and low pressure, but in most instances they were aiming to supply wants which only existed in their own imagination. In France, as far back as 1770, Nicholas Joseph Cugnot built a steam carriage having 13-inch cylinders. This engine, which was the second or third of the kind constructed by him, was defective only in the want of boiler power. The steering gear was somewhat sluggish, but as a high-pressure engine, nothing was lacking, and the workmanship of the machine, still preserved in the Conservatoire des Arts et Métiers, Paris, is very creditable. No success was possible in this line, however, because such a machine could not have been put to any commercial use at that time. It was designed by the constructor to haul heavy artillery, a service which would have hardly brought fame or fortune in those days of bad roads. The world's work at the time of which we write consisted almost exclusively of water raising in some form. Hence, to be successful, it was necessary that the inventor should devote himself to the manufacture of steam pumps. It was to this work that James Watt turned his attention after his invention of the separate condenser, and it was to this that his keen business partners, Dr. Roebuck, and afterward Mr. Boulton, carefully kept his attention constantly devoted. Hence his success. He was the fortunate inventor, who happened to be in the right place at the right time, and who fell in with strong business men with capital, who kept him in the successful track. Glancing over the pages devoted to James Watt and his achievements, we are impressed in a way very different, we imagine, from that which the author intended; for we think that it will occur to every candid and thoughtful person, upon reading the work, as it did to us, that James Watt was a greatly overestimated man. It would seem that during the period of his greatest mental activity, there was no important mechanical invention made in England which he did not at once, and boldly, claim as his own; and, surrounded

as he was with powerful admirers and having command of large capital, in most cases his claims, even in the face of the clearest evidence, were allowed. As a steam-pump builder he was at the head of all competitors; as the inventor of separate condensation he deserves a vast amount of credit; but it is hard to find, even from the most partial statements, that he contributed more than many other engineers to the success of the rotative engine. Other men sowed and he, in the fullness of time, entered into their harvest.

Although, as compared with James Watt, Col. John Stevens, of Hoboken, receives but meager attention, his works and the mechanical revolutions which he practically began, place him far higher in the ranks of inventors than Watt. Col. Stevens was some 50 years ahead of his time, yet in spite of this disadvantage he accomplished results and laid the foundation for others, the importance of which can hardly be overestimated. Had his life marked an epoch, it seems very probable that he would have worn honors now given to others. His foresight in regard to the steam engine, as expressed in his letters and other writings, now read like prophecies.

In England, Jonathan Hornblower, William Bull and Richard Trevethick showed a vast deal of inventive genius and accomplished great results, when we consider the disadvantages under which they labored. If they had had Watt's powerful friends and partners, and been first as steam-pump builders, doubtless the history would have remained much the same as at present, but the names at the head of the list would have been very different. It is only when we take into account the influence that circumstance has upon men's success, that we can estimate the relative greatness of the men as men or inventors.

Toward the close of the last century, there began to be a demand in England for power for other purposes than that of pumping water. Smeaton, we believe, was the first to put up a rotative low-pressure engine. This was of the old atmospheric type, and it was a long time before Watt attempted the same thing. For a time Smeaton's engines were superior in economy to those built by Watt, and to this rivalry doubtless is due the rapidly increasing economy in the duty of Watt's early pumps.

The first steam engine, as distinguished from a steam pump, built by Watt, to produce a rotative motion, was the famous pair put up for the Albion mills. Mills and engines proved a failure, and after sinking many thousands of pounds, they took fire, after six years of serious losses, and burned to the ground. The establishment of Boulton & Watt had several great advantages. Boulton was one of the best business men of his day. While possessing all the qualifications for an ordinary commercial success, he had the immense advantage of being first in a vast field, and by his foresight and business tact, kept the field practically to himself for some 25 or 30 years.

Although the steam engine, in its modern form, had been perfected early in the last century, and most of the modern improvements had been suggested, it was not until the expiration of the Watt patents in 1800, and the dawn of a new era in manufacturing, that a marked progress began to be felt in the application and improvement of the modern form of the steam engine. With the year 1800 began the second period of application and development of the modern steam engine. In England the experiences with the Savary engines and their weak boilers, together with the success of the atmospheric and low-pressure engines, naturally inclined the public, and inventors as well, toward the low-pressure engine, in which 6 or 7 pounds was the greatest pressure used, and with which a negative pressure in the boiler was not so uncommon as to be a novelty. In America, on the other hand, with the characteristic boldness of the people, high-pressure were at once recognized, both as desirable and possible, and high-pressure engines were adopted as the best means for the production of power. To-day America can almost claim the high-pressure, or non-condensing engine, as distinctively her own. Certain it is, she has done more toward developing its possibilities than any other nation, and, in proportion to the total number of steam engines she uses, has more of them than any other.

In England, the year 1800 was marked by the expiration of all the essential steam-engine patents of Boulton & Watt, and the manufacture of the steam engine was free to the world. Just at this time, power became an industrial necessity. Animal power, even in those cases where it could be employed, was too costly; water powers were already well improved; consequently, the field for manufacturers of engines was ready. Watt retired at the beginning of the century from active business life. Boulton still continued, but his monopoly was gone, and his business ability was not equal to the task of retaining his position against the tremendous odds. New engine-building establishments sprang up all over the kingdom. There were a great number of failures, and many a steam engine was set up which was scarcely able to do more than turn its shaft and work its own air pump. But the world was gaining experience, and mechanics were gaining skill. It must be remembered that, in the days of which we write, a slide-rest turning lathe, or a screw-cutting lathe, were practically unknown, and that planers and machine tools in general were scarcely more than names. Indeed, a good mechanic to-day could go into a blacksmith shop of the better class, and, getting his castings from a foundry, build an engine far easier, and more accurately, than was possible 70 years ago. Until one examines the mechanical works of that time, he can hardly conceive with what rough and imperfect tools engines were built.

First after pumping, English and Continental inventors turned their attention toward the production of steam carriages, or locomotives. In this country, the earliest demand for power was for driving mills. Oliver Evans, with his high-pressure "Columbian" engine, as he called it, supplied this want very successfully, and for many

years was the leading builder of steam engines in America. In 1804, Evans built a steam dredging machine for the city of Philadelphia, and, to prove its capabilities, mounted it upon wheels, and, connecting these with its own engine, drove from the works up Market street, around to the water works, and then launched it into the Schuylkill. The engine drove the dredging boat by means of a paddle in the stern. Evans was not the first to demonstrate the fact that a steam engine could be made to drive itself upon land, but the experiment helped to establish the certainty of the fact in the public mind. Evans narrowly escaped being, in a sense, the father of the Mississippi steamboat. He built an engine, intended for a boat which was to be built at New Orleans, as we have already mentioned, but low water in the river, and financial complications, prevented the construction of the boat, and the engine was set up driving a saw mill, where it proved very successful. Evans has hardly been appreciated in this country, but, from all that has been written, it seems safe to say that he revolutionized the arts of the miller and millwright.

The least known, but mechanically most successful, applications of the steam engine during the early part of the century, was to the propulsion of carriages upon common roads. And we may say that, until utterly defeated by external causes, the steam carriage was the most successful financially.

From the time of Cugnot's steam carriage or traction engine, in 1770, to 1822, there had been almost a continuous line of experimenters and inventors. At that time (1822), Mr. Goldsworthy Gurney took up the subject, which ended in the first successful steam carriage, some five years later. This was not, however, the first steam carriage that took a long journey under steam. In 1803, Trevethick built a full-size machine, which, on its way to London, was driven from Camberne to Plymouth, a distance of 90 miles, by its own engines. Gurney's first machine was driven by mechanical legs. In spite of this unmechanical device, it made long journeys, on one occasion making 85 miles in 10 hours, including all stops. The next year he built a steam passenger coach, which was not only creditable and successful from a mechanical point of view, but, if we remember rightly, was a source of income for a time to the owner. The boiler was a tubular sectional, the first of the kind built, and carried 70 pounds of steam. A reversing link motion was provided, the draft was forced by a blower, and several very important mechanical features were well worked out. Walter Hancock was the next who accomplished anything worthy in this line. In 1831, there were a great number of steam carriages under construction for different gentlemen and firms. Sir Charles Dance, the same season, placed one of these carriages, of whose design we know but little, on a regular line between Cheltenham and Gloucester, where, in four months, it ran 3500 miles, carrying 3000 people, making a distance of nine miles in from 45 to 55 minutes. Messrs. Ogle & Summers' carriage attained a speed of from 32 to 35 miles per hour, and, like the other carriages, met with no accident until they were driven off from the roads, as we shall explain. This carriage, on a rising grade, made 2½ miles per hour. Many other successful coaches were running in and about London, carrying from 11 to 20 passengers. Many of the companies for whom carriages were built, were unsuccessful, probably from want of business management, rather than from any fault in the carriages. The speeds ranged from 9 to 12 miles per hour when loaded. These coaches, or carriages, passed through the crowded streets of London with perfect ease, and did not frighten the horses nor discommode pedestrians. In 1835, Hancock built a coach called the "Erin," which could carry 20 persons. It towed three omnibuses and a stage coach with 50 passengers. On level ground it made 10 miles per hour, and with lighter loads made a greater speed. In 1836, all Hancock's carriages were put on to the Paddington road, running regular trips for five months. Some 712 trips were made in the time, 4200 miles run, and they passed through the city 200 times. The average running time was 5 hours 17 or 18 minutes. Altogether, Hancock built nine steam carriages, capable of carrying 119 passengers besides attendants. In 1833, 20 carriages were running in and about London. They had attained a speed of 15 miles per hour, in some cases, on up grades of one in twelve, and one had kept up a speed of 30 miles per hour for 4½ hours. A magnificent success seemed assured. A surprising degree of perfection had been attained in the short space of five years. A committee of the House of Commons came to the following conclusions:

1. That carriages can be propelled by steam on common roads at an average rate of 10 miles per hour.
2. That at this rate they have conveyed upward of 14 passengers.
3. That their weight, including engine, fuel, water and attendants, may be under 3 tons.
4. That they can ascend and descend hills of considerable inclination, with facility and safety.
5. That they are perfectly safe for passengers.
6. That they are not (or need not be, if properly constructed) nuisances to the public.
7. That they will become a speedier and cheaper mode of conveyance than carriages drawn by horses.
8. That as they admit of greater breadth of tire than other carriages, and as the roads are not acted on so injuriously as by the feet of horses in common draft, such carriages will cause less wear of roads than coaches drawn by horses.
9. That rates of toll have been imposed upon steam carriages which would prohibit their being used on several lines of road, were such charges permitted to remain unaltered.

In the face of such facts, the reader naturally asks, how came it to pass that this promising application of the steam engine has been so completely forgotten, that people to-day are gravely heard discussing the question of whether a steam carriage can be made to run on common roads or pavements, and whether it will not frighten horses and be a nuisance from smoke and dust? The answer is, steam carriages were crushed out of existence by a powerful enemy, not, as might be supposed, the coaching or horse interest, but by the railroad companies, who found themselves at a stand from the opposition of property owners. The argument used was that railways were unnecessary, as steam coaches traveled as fast as railway trains and were much more convenient. To kill the steam coaches was their only hope. Frightful tolls were imposed when it was possible. Bills, in some instances, being pushed through Parliament for the purpose by the railroad interest. The only accidents that happened were caused by spreading 18 inches of broken stone on turnpikes under pretense of mending them, but really to break down the steamers. Hancock broke one or two driving axles and then withdrew. Others were driven off by the tolls, which were frequently equal to the whole fare of the passengers. It was a fight of great corporations against individuals, and the corporations won. The methods taken were dastardly, and the reader grows indignant at reading of the destruction of such a promising field of enterprise, which might have been a valuable and profitable aid to the railroads if it had been rightly encouraged. The two or three years' war which was then waged against steam carriages has delayed progress in that direction for fifty years, and it will be many years to come before engineers and the public will again turn their attention toward steam carriages.

As "feeders" to a railway, in a country where good roads abound, steam carriage lines could be made invaluable, and in many instances could be made to take the place of costly lines of lateral roads, which are usually expensive luxuries for the corporations maintaining them.

Metallurgical Notes.

ANALYSES OF BESSEMER AND OPEN-HEARTH STEEL FROM DIFFERENT PERIODS OF THE PROCESS.

Some interesting results of analyses made of products of the different periods of the Bessemer and open-hearth process, were made from Bessemer for the Paris Exhibition, to show the gradual elimination of manganese and silicon:

| Bessemer Process. | | Silicon. | |
|---------------------------------|--------|----------|--|
| Manganese. | | Silicon. | |
| 1st period..... | 1.3502 | 0.9150 | |
| 2d "..... | 0.8371 | 0.3306 | |
| End of operation..... | 0.1802 | 0.0443 | |
| Open-hearth Process. | | Silicon. | |
| Manganese. | | Silicon. | |
| Pig..... | 1.0833 | 0.7595 | |
| After 1st charge wrt. iron..... | 0.8337 | 0.1073 | |
| " 2d "..... | 0.0336 | 0.0393 | |
| " 3d "..... | 0.0342 | 0.0163 | |
| " 4th "..... | 0.0306 | 0.0187 | |
| End of operation..... | 0.0883 | 0.0198 | |

A high temperature seems, therefore, to be favorable to the retention of silicon and manganese. The amounts remaining are smallest in the hearth, greater in the puddling furnace, they increase in the Bessemer converter (using charcoal pig directly from the furnace), and, finally, are most considerable in the gas reverberatory furnace, if its temperature is decreased by the additions of wrought iron.

COMBINATIONS OF THE BESSEMER AND THE OPEN-HEARTH PROCESS.

Some Austrian works combine the Bessemer and the open-hearth steel processes for the manufacture of special grades of steel. Thus, at Neuberg, so-called "refined Bessemer steel" is made by decarbonizing in the converter, and by bringing the blow into an open-hearth steel furnace before the addition of spiegel. It is in the latter furnace that the process is finished. Quite an opposite course has been adopted at Ternitz for making rail steel. There the pig is at first treated in the open-hearth furnace by additions of steel scrap, then it is blown in a converter, when the product is finished in the regular way. An analysis of the latter steel yielded:

| | |
|-----------------|-------|
| Carbon..... | 0.401 |
| Silicon..... | 0.030 |
| Sulphur..... | 0.017 |
| Phosphorus..... | 0.024 |
| Copper..... | 0.022 |
| Manganese..... | 0.212 |

ESTIMATION OF IRON IN ORES.

Mr. T. T. Morrell, chemist of the Cambria Iron Works, contributes to the *Bulletin of the American Iron and Steel Association*, the following description of a method for estimating iron ores: For the determination of iron in ores, dissolve in as little hydrochloric acid as possible 0.200 grams of the ore, and filter from any insoluble matter. If any of the iron exists as protochloride, add permanganate of potassa until all is changed to sesquichloride, and boil until every trace of free chlorine is expelled. Transfer to a flask holding 150 or 200 cubic centimeters, dilute to 60 or 70 cubic centimeters, and cool. Now close the flask with a rubber stopple, through which pass a tube for the admission of carbonic acid, and one for the escape of the air. When the flask above the liquid is entirely filled with carbonic acid, throw in about 3 grams of pure potassium iodide, shaking the flask gently to promote solution. In two or three minutes, when the iron has become entirely reduced, run in 20 or 25 grams of pure mercury, which has been carefully weighed. As a little air may have been admitted by the removal of the stopple, the stream of carbonic acid should be continued through the flask for some time longer, when the tubes may be closed with rubber caps. The dark colored solution is gradually decolorized by the mercury, and the contents of the flask should be constantly agitated, by quite a rapid rotary motion, to separate the mercury into small globules and promote this action. When the solution becomes colorless, pour it off, and rinse the mercury several times with distilled water. Finally, transfer the mercury to a small porcelain crucible, dry it with bits of filter paper, and weigh. From the loss of weight of mercury, calculate the amount of iron: 100 of mercury = 56 of iron. If an acidulated solution of the potassium iodide yields any color after standing 30 minutes in an atmosphere of carbonic acid, the decolorization of the solution of iron must be stopped when the same tint is reached, or a suitable deduction be made in the results obtained. This method is equally accurate, and much more rapid and convenient, than the permanganate.

* Chambers's Cyclopaedia says that "It was not until the winter of 1763-4 that he began the investigations, which ended in his improvement of the steam engine."

† A History of the Growth of the Steam Engine, by Robert H. Thurston, A. M., C. E., professor of Mechanical Engineering in the Stevens Institute.

The Situation in the Ironton (Ohio) District.

The Ironton *Register* discusses local matters as follows:

To-day there is a better, more hopeful feeling pervading our community than when 1878 began. There is a prospect that nearly all our industries will be more fully employed the coming year than last.

The production of pig metal in 1878, in this county, was 34,900 tons. This is nearly 6000 tons less than in 1877. The downfall of *Atta*, in February last, is the cause of this difference. *Alice* ran only 55 days of the past year. *Sarah* furnace, however, came, in 1878, with a big production. Of our 16 furnaces, all were more or less in blast last year, excepting Grant, Center, Iron and Steel, *Atta* and *Vesuvius*. Of the 34,900 tons made, 17,000 tons were stone-coal iron, 7500 tons charcoal cold-blast and 10,400 charcoal hot-blast. During the year, there has been a slight accumulation of hot-blast irons, and a decrease of cold-blast. Belfont furnace ran 203 days the past year, and *Sarah* furnace about the same time. The year has been a severe one for the furnacemen, but all things considered, there is really a better feeling among them than there was a year ago. The coming year will, doubtless, record more furnaces in blast than in 1878.

Ironton lost entirely one factor of her iron industry last year—the Iron and Steel mill. In 1877, taking the number of days' runs of all the mills and striking an average, it was 193 days for each mill. In 1878, with two mills in operation, the average days' run were greater, being 215 days for the two mills, *Lawrence* and *Belfont*, in 1878, against 193 days for the three mills in 1877.

The Belfont mill was in operation 246 days last year. In that time the production was 167,834 kegs of nails, about 100,000 of which were made in the past six months.

The *Lawrence* mill ran as follows: Forge, 138 days; bar mill, 184 days; guide mill, 148 days; hoop mill, 148 days. The average, which is the number of days of full operation, was 154½ days. During the year, the mill turned out 3046 net tons iron, and used 269,946 bushels of coal.

The year closed with a somewhat more hopeful feeling than was felt at the close of 1877.

Lambert & Gordon's shop ran 206 days during 1878, and in the foundry melted 341 tons of metal.

[From the New Haven Daily Morning Journal and Courier, Jan. 3, 1879.]

A NEW YEAR'S JUBILEE.

An Entertainment to Over One Thousand Employees—Mr. J. B. Sargent's Happy New Year to His Help—Great Declaration of Turkey and a Cargo of Other Choice Edibles—Joyous Faces and Happy Hands—A Fine House-Warming.

One of the most interesting New Year's events in a long time, of a local nature, was the entertaining by J. B. Sargent, Esq., of the employees of Sargent & Co., at his elegant residence, corner of Elm and Church streets. The reception lasted from 7 till 10 p. m. As 7 o'clock was struck by the City Hall bell, the mansion, brilliant with light in every one of its many windows, began to receive its guests, who were ushered in by selected men from their own number, some thirty-three in all on duty. Admirable music from a fine orchestra greeted the ear on entering. In the beautiful parlors Mr. and Mrs. Sargent received the visitors, and after the pleasant greetings, the throngs began to thread the halls and pass about the premises, returning to the large dining-room, where at least one hundred and fifty, and some estimated two hundred, could dine at one time. The sight the great table presented was enough to drive an epicure into expressions of delight, and make an ascetic sigh for some other profession. Gracing the center of the feast was a beautiful centerpiece, laden with the choicest flowers, natives and exotics, while the celebrated New Haven caterer, Mr. John Redcliffe, with a corps of 37 assistants, including waiters, drivers of the commissary wagons, female help and others, was supplying the gaps made in the ranks of the turkeys with more birds, and kept the ice cream pyramids, castles, towers, equestrian pieces and other forms of the delectable compound, and other supplies of choice eatables, pouring in. There were over half a ton of turkey, a hoghead of opened oysters, a hoghead of lemonade, another of coffee, a cart load of cake and 3,000 biscuit, and no end of oranges, apples and confectionery, and there were 12 persons in the attack. The residence, in the full beauty of new and elegant woodwork finishing and furniture, was, from top to bottom, freely thrown open for the occasion. On leaving for the evening and in passing out, each person was given a package filled with bon-bons for the little ones at home. There were eight or ten brimming wagon loads of these supplied. Nothing was left undone to add to the comfort of the guests. The married men had an invitation to bring their wives, many of whom were in the happy throngs. A "good time" was enjoyed by all. Outside the house, throngs of the workmen occupied the walks, waiting for comrades to walk home, and talking over the reception with the utmost satisfaction. Nothing finer of the kind in its quality than the spread afforded could be found in New York or Boston, and so much remained that a fine treat was dispatched to the Home of the Friendless, and another to the St. Francis Orphan Asylum, in the latter being about 300 bags of choice edibles, besides a very handsome donation of turkeys. The several night watchmen of the Sargent manufactory who could not be spared from their duties were remembered, each with a fine turkey yesterday. The workmen will long remember with pleasure the happy affair.

Sargent & Co.'s may justly be considered one of the most important business interests of the city, and extensive as is the establishment of the concern, it is to be still further enlarged by the erection of new and important buildings. Plans have just been completed for one or both of them—one to

be erected speedily, being called for by the need of still more room for storage and packing purposes. The other, which will be erected later, will be a still further addition to the number of foundry buildings. The extent of the establishment is seen from the fact that the space occupied by the flooring is equal to a field of fully seven acres in extent. Several very large and noticeable buildings were erected in the past year. The concern, it may also interest the reading public to know, manufacture no less than 7000 different articles of hardware. Its new office is one of the largest in New England, and is handsomely finished in Southern pine and other woods, and is provided with every convenience and accommodation. It includes, besides the private office of Mr. Sargent, a general public business office, superintendent's office, and the departments for the purchase of materials and supplies; the pay-roll clerks, the cost clerks, the New York, Southern and Western entry clerks, foreign entry clerks, New England and British provinces business, the bookkeepers and the cashier. The subdivision of these stations is now being completed. The limits of our space to-day forbid a general inspection of the establishment in all its ramifications of business, its wilderness of light and heavy machinery, and scores of extensive work-rooms. This concern has converted unimproved ground and the waste water front into a place teeming with industry, all of which has been done in the past 15 years. Mr. Sargent locating in this city 15 years ago. About 100 employees of the concern in New York city, at the wholesale house, were not overlooked in the invitation to the dinner, but, owing to the distance, the kind offer could not generally be accepted.

A schooner which arrived in New York from Para, last week, brought seven men who had been engaged in building the Mamore and Madeira Railroad in Brazil. The fever compelled them to leave the country, and they report that it is now demonstrated that only negroes or Chinamen can be profitably employed in the enterprise. Only four miles of road were completed when they left. The laborers who went out have mostly left, and natives are being employed to better advantage. This enterprise has been quite unfortunate.

Special Notice.

Partner Wanted,

with \$30,000 to \$50,000, to take the place of a member retiring from a New York Jobbing Hardware and Cutlery House, whose business relations with all parts of the United States are extensive, of long standing and of a desirable nature. A party identified with hardware or cutlery interests, and who would take an active part, would be preferred. Please address communications to H. F. E., Office of New York Journal of Commerce.

To Let,

A Vacant 4-story and basement Brick Factory,

45x96, with 75 Horse-Power Engine, all in complete order, with vacant lot adjoining; shafting and pulley on each floor.

Cor 1st and N. 3d Sts., Brooklyn, E. D.

Inquire of

H. C. RICHARDSON,

59 & 61 Grand St., Brooklyn, E. D.

FOR SALE OR TO LEASE—Factory property at Elizabethport, N. J., comprising cutting, annealing, tumbling and finishing shops; also engine and boiler and tools to make saddlery hardware or other malleable iron goods.

P. BALEN, 84 Broad St., New York.

JOHN C. WILMERDING, Auctioneer.

AUCTION NOTICE.

Peremptory Sale of the entire Manufactured

Stock of the "Coles Universal Feed

Sewing Machine Co.," with

Braiding Attachment,

by

Wilmerding, Hoguet & Co.,

On Tuesday, January 21, 1879, 10½ a. m.,

At No. 416 West 14th St., New York City.

Also 3575 shares, the controlling interest in the "Coles Universal Feed Sewing Machine Co.," all the foreign patent rights; all the special tools, being upwards of 1200; all the machinery, in perfect condition, made by Brown & Sharpe, Pratt & Whitney, and other first-class machinists.

Catalogues and all information may be had now and until day of sale, of WILMERDING, HOGUET & CO., 64 White St., or of S. W. JOHNSON, 405 West 14th St., where the property is ready for examination.

EXCHANGE.

Will exchange for stock of hardware, a fine farm of 277 acres in Loudoun Co., Va., on W. & O. R. R., 25 miles from Washington, having a large, commodious house, barn and out buildings, all new; sixty acres good oak timber, balance meadow, pasture and tillage; stream of running water, 400 assorted fruit trees (all grafted), 150 bearing grape vines, small fruits, &c. Address J. M. H., 1629 10th St., N. W., Washington, D. C.

For Sale.

The constantly increasing demand for Wheat Drills and other goods of my manufacture, compels me to give my whole attention to my factory; hence I offer for sale my (controlling) interest in the Wholesale Hardware Business of *Over & Anderson*, in Indianapolis, Indiana. This house has the best custom in the city, and its business is steadily increasing. Not a large capital required. For particulars correspond with EWALD OVER, Indianapolis, Ind.

MANAGER.—A GENTLEMAN OF THIRTY-five, who is out of position by reason of contingencies beyond the control of himself or the proprietors, wishes a new engagement. He is well up in metallurgy as a science, has had eight years' experience as practical manager in Steel Works and has been very successful in handling men. Address M. W. T., Scotland, Pa.

FOR SALE,

A one-half interest in an old-established Foundry and Machine Works, capable of doing a business of \$50,000 per annum. Will sell very low in order to increase the working capital to meet the demands of the trade. Address "E. M. C.," Office of The Iron Age, 83 Reade St., New York.

Special Notices.

Special Announcement SECOND-HAND AND NEW TOOLS FOR SALE.

The Tools in the following list are all of Wood, Lighte & Co.'s make, have been used, but are all in good order and will be sold low:

Five Engine Lathes, 15 in. swing 6 ft. bed.
Six Engine Lathes, 20 in. swing 7½ ft. bed.
Five Engine Lathes, 20 in. swing, 8 ft. bed.
One Engine Lathe, 21 in. swing 6 ft. bed.
One Engine Lathe, 21 in. swing 16 ft. bed.
One Engine Lathe, 24 in. swing 12 ft. bed.
One Engine Lathe, 25 in. swing 12 ft. bed.
Two Upright Drills, 27 in. swing, not geared.
One Upright Drill, 22 in. swing, not geared.
One Upright Drill, 32 in. swing, back geared and self feed.
One Planer, 24 in. x 23 in. x 4 ft.
One Planer, 24 in. x 24 in. x 4 ft.
Two Planers, 32 in. x 30 in. x 8 ft.
One Planer, 32 in. x 30 in. x 10 ft.
One Planer, 37 in. x 37 in. x 10 ft.
One Planer, 37 in. x 36 in. x 15 ft.
One Planer, 72 in. x 66 in. x 24 ft.
One Shaping Machine, 12 in. stroke.
Four Bolt Cutters, various sizes.
Two No. 2 Milling Machines.
One Horizontal Boring Lathe.

The following are all new tools to be sold very low, and are all Wood, Lighte & Co.'s make:

Two Engine Lathes, 15 in. swing, 6 ft. bed.
One Engine Lathe, 15 in. swing, 6 ft. bed.
Two Engine Lathes, 16 in. swing, 8 ft. bed.
One Engine Lathe, 20 in. swing, 20 ft. bed.
One Engine Lathe, 28 in. swing, 14 ft. bed.
Three Planers, 24 in. x 24 in. x 4 ft.
Two Planers, 24 in. x 24 in. x 6 ft.
One Planer, 36 in. x 36 in. x 12 ft.
Two Shaping Machines 8 in. stroke.
Three Shaping Machines, 12 in. stroke.
One Shaping Machine, 14 in. stroke.
Two No. 1 Bolt Cutters.
Seven No. 2 Bolt Cutters.
One No. 1 Bolt Cutter, with centers.
Five No. 2 Bolt Cutters, with center.
One No. 1 Milling Machine.

For sale by the

GEO. PLACE MACHINERY AGENCY,

121 Chambers and 103 Reade Sts.

Leigh's Tables of Mercantile Discounts

(5% to 8½% and all the combinations.)

Arranged in three parts:

I. Comparative Discounts.

II. Comparative Net Prices.

III. Computing Tables.

Parties desiring a reliable, comprehensive and practical work on *compound discounts*, are invited to examine the plan of this book. Specimens of the different parts will be mailed free upon application to the author at St. Louis. The book mailed postpaid to any address for \$1. Address

EDWARD B. LEIGH,

St. Louis Elevator, St. Louis, Mo.

Or either of the Publishers, viz:

IVISON, BLAKEMAN, TAYLOR & CO., New York.

R. T. A. ENNIS, St. Louis.

TO EXPORTERS.

A PRINTED LIST OF UPWARDS OF

3000 FOREIGN BUYERS

of American Goods, all of them in Good Standing, together with all the United States Consular

abroad, and rates of postage on printed matter to all countries. Now ready. Price \$5.

WM. ATKINS & CO.,

14 John St., New York City.

A GENTLEMAN,

residing in London, England, now on a business journey in America, of large commercial experience in the United States, England, France, Italy, Egypt and Turkey, speaking French and Italian; well acquainted with the London buyers for the Cape, India, Australia and South America, is open to make arrangements for representing jointly three first-class American manufacturers in London. Unexceptionable references.

Add. address

Office of The Iron Age, 83 Reade St., New York.

THE PARTNERSHIP HERETOFORE EXIST-

ing under the firm name of Graef & Nevins,

has been dissolved by mutual consent.

Mr. Albert Graef will continue the business as heretofore.

New York, January 7, 1879.

WANTED.—A position of any kind in a whole-

sale hardware or manufacturing house, by a

young man of eleven years' experience in one

of the largest houses in New York, or would

represent some out of town manufacturer in New

York and vicinity, and sell goods to the trade on

commission. Address

Office of The Iron Age, 83 Reade St., New York.

SITUATION WANTED.—TIN AND

Sheet Iron Worker desires work; city or country;

at the bench or counter.

Address CHAS. B. GARRISON,

Greenwood, Del.

A MAN OF LONG EXPERIENCE WITH ONE

of the largest and best known houses in this

city, desires a situation. Thoroughly conversant

with Locks, Bronze and Butlers' Hardware.

Competent bookkeeper. Salary moderate. No

objection to leave city. Address

HOWARD,

Office of The Iron Age, 83 Reade St., New York.

TRAVELING SALESMAN.—A YOUNG

man, thoroughly posted in hardware and all

its branches, particularly cutlery, with several

years' experience on the road, desires a position

with a manufacturing, jobbing or importing house,

where by close attention to business he can have a

permanent position and make himself valuable to

his employers. Address

Office of The Iron Age, 83 Reade St., N. Y.

RUSSIA.

Advertiser, experienced in Machinery, especially agricultural, with a very large connection, seeks to REPRESENT A GOOD AMERICAN FIRM.

Address JOHN E. GREAVES,

Berdiansk, S. Russia.

Special Notice.

The undersigned offer their services as Agents to

makers of American Cabinet Hardware.

They keep a full line of UPHOLSTERERS' AND

CABINET MAKERS' MATERIALS.

LOUIS WINDMULLER & ROELKER,

20 Reade St., New York.

Address in FRANKFURT-ON-MAIN, GERMANY,

ERWIN ROELKER.

Hardware Business

For Sale,

in one of the best situations in Philadelphia, Pa.

Address

E.,

Office of The Iron Age, 83 Reade St., N. Y.

Special Notices.

JENNINGS'S

COMBINATION DISCOUNT TABLES.

(Published by the author.)

(2% to 85% and all the combinations.)

The Discount or Net on any amount of dollars and cents, from a penny to one million dollars, can be ascertained in a few seconds entirely by Addition. Just the thing for making or proving invoices, finding Net Value of goods bought or sold, and comparing different Discounts, thereby saving time, blunders and Headwork.

Shows at a glance either the Discount or Net of \$1.00, with any combination.

Contains Computing Tables for nearly five times as many combinations as any other work published.

Is arranged so that the eye has no horizontal lines or columns to follow.

The number of Dollars or Cents and the Discount or Net of the same are seen at one glance. No Decimal Points to be changed in the mind.

READ! READ! READ!

The first edition of 1000 copies cost nearly \$2.00 per volume, without allowing anything for the labors of the Author. Having electrolyte plates of each page, the expense of second edition is much less.

For the purpose of more quickly introducing the work, the publisher proposes, until further notice, to send a copy (Counting-House Edition, price, \$3.00), postpaid, to any address on receipt of

ONE DOLLAR.

In due time the price will be advanced so as to afford a moderate profit. Merchants, Manufacturers, Bookkeepers and Clerks now is your time. Send in your Dollar and receive the book by return mail.

This book has a copious

INDEX,

which is more for convenience than necessity, and would not be referred to one time in twenty.

Its principal use is to prevent confusion in finding combinations that are arranged in different orders; thus, the index shows that 25 and 7½ and 5 per cent. is found in the tables on page 12, under heading 25 and 5 and 7½ per cent.

Currency may be sent by mail at publisher's

risk. Address

S. H. JENNINGS,

Deep River, Conn.

One 9-inch Train Roller,

One 10-inch Train Roller,

Both with Housings.

Two Steam Hammers,

One Pair Shears,

One Lot Steel 1-20 Moulds,

Three Large Woodward Steam

Pumps,

Three Small Steam Pumps,

Two Hoisting Engines,

Three Steam Boilers,

One Lighthouse Condenser,

One Surface Condenser,

Deck Pumps, Low Pressure Gauges,

Registering Gauges, &c.,

FOR SALE LOW BY

DANIEL W. RICHARDS & CO.,

Dealers in

Scrap Iron & Metals,

88 to 96 Mangin St., New York.

Foreign Houses

Importing American Goods, and desiring the services of a reliable Agent at a moderate commission to attend to all their business in the United States, are invited to correspond (in English) with the undersigned.

Has had three years' experience as purchasing agent for Messrs. Wm. Marples & Sons, Sheffield and London, England.

Address

S. H. JENNINGS,

Deep River, Conn., U. S. A.

Bissell & Welles,

Wholesale Hardware Auctioneers,

83 Chambers and 65 Reade Sts., N. Y.

Sales held weekly for the trade. Consignments

solicited. We refer to the leading Manufacturers

and Importers.

NOTICE.

Manufacturers of hardware who are not represented in New England, and who are disposed to consign their leading goods, can make satisfactory arrangements with the undersigned, who have facilities for introducing their goods to the whole

sale and

[illegible]

IRON.

American Pig.—The demand for Pig Iron remains trifling. We continue to quote: Foundry No. 1, \$16.50 @ \$18; Foundry No. 2, \$15.50 @ \$16.50; Gray Forge, \$14.50 @ \$15.50.

Scotch Pig.—There is but little Scotch Pig on the market. The arrivals have been very slight—a fact accounted for, in a small measure, by the difficulties of navigation for the past week. The demand is very quiet, and no sales worth recording have transpired during the week. Quotations remain as before, viz.: Eglington, \$19.50 @ \$20; and Coltness, \$22.

Rails.—The demand for Steel Rails is more active than it has been for a long time. Sales of 20,000 to 25,000 tons are reported for the week. Prices are firm at same quotations as at our last writing, viz., \$43 at tidewater. We quote Iron Rails, at mill, \$32 @ \$35, according to quality, section, terms, &c.

Old Rails.—We hear of the sale of 1000 tons of Old Rails on private terms. We quote the same, \$18 @ \$19.

Scrap.—There is no demand, or next to no demand, for Scrap Iron. No sales are reported. We quote No. 1 Wrought, from yard, \$21 @ \$22.

METALS.

Copper.—Sales have been limited to small lots Lake Superior at 16¢, summing up altogether some 200,000 pounds. This is also the closing figure, while Baltimore is nominally worth as much. No later telegrams have been received from London.

The following yearly statistics have been prepared by Messrs. F. W. Heyne & Brother, of this city: Stock brought forward from 1877, 7,500,000 lb. Production of Lake Superior Copper, 1878, 38,000,000 lb.; do. from other mines, 8,500,000, giving a total production for the past year of 46,500,000 lb., and a supply of 54,000,000 lb. The home consumption has been 34,000,000 lb., including 4,000,000 lb. for cartridges for export, and the export of Ingot Copper, 13,000,000 lb., leaving a stock on the 1st January, 1879, of 7,000,000 lb., against 7,500,000 on December 31, 1877. The *London Mining Journal* of December 27 contains the following: "There have been slight variations only in the price of Chili Bars, scarcely amounting to more than 5/8 ton at the most, and the market may be described as almost stationary. The stock on the 15th inst., in Liverpool and Swansea, was 23,388 tons, against 23,662

tons on November 29, or a reduction of 274 tons, and the charters for the first half of this month were telegraphed 1300 tons, and as the previous charters were only 1200 tons, it is expected that the figures on January 1 will show a considerable reduction upon the previous totals. At the same time there is an increase in the supply, compared with the two previous years, but it is chiefly in precipitates, there being an excess this year over that of 1877 of about 5000 tons, and about 7000 tons more than in 1876. The total exports are favorable for this year, but there is not so much doing just now, and smelters are mostly very bare of work, and there is no difficulty in obtaining an expeditious delivery, but India is not buying, owing to the low and uncertain rate of exchange." Our exchanges from the West Coast have reached us, bearing date Nov. 23. They write from Santiago (Chili), that the production of Copper is as large as ever. Manufactured Copper is dull, and the combination prices, which are unchanged, are nominal. We quote new Sheathing Copper, 20¢; Brackets, 22¢, and Bolts, 22¢. American Yellow Sheathing Metal, 13½¢; Yellow Metal Bolts, 20¢, and English Yellow Sheathing Metal, 22½¢ @ 12½¢ currency, in bond.

Tin.—Our market continues to be lifeless, with all supplies and little demand. We quote Straits, 14¢ @ 14 1/4¢; English Refined, 14¢; Common ditto, 13 1/2¢ @ 13 3/4¢, all large lots, on the spot. We quote December shipment of Straits Tin, 13 1/2¢, and January ditto, 13¢. Exports from Singapore continue to be liberal; thus, during the month of December 570 tons were shipped to the United States, and 470 tons to England. There are now afloat for the United States, altogether, about 5,000 slabs. The foreign markets are quiet, with a downward tendency. Singapore cables \$18.25 per picul and London, 60s. The following extracts from letters received from parties in Australia by last mail, may prove instructive and valuable in forming an opinion of the future of tin: "Most of the Tin mines in this

Ons are closed, and it is only the Ore on brass that is coming to hand now. Cheaper labor or better prices for Tin must be got before the closed mines will resume work." Another correspondent says: "Most absurd reports have been spread at home as to the richness of the late discoveries in Tasmania, for which there is no foundation whatever, and when the effect of such has passed off we may expect some recovery in the Tin market. The following is from a third writer: "We the Keweenaw and Pyremont Tin Mining Works will probably close, as there is not sufficient Ore to employ them; although out of 14 furnaces in Sydney, 12 were closed," will be closed, leaving only two work." Tin Plates have been moderately firm during the week, and remain quiet at the following quotations:

| | | | |
|--------------|--------|--------|----|
| 100 lb | 20 | 25 | 30 |
| Coke Tin | \$5.75 | \$6 | |
| ditto Terns, | | | |
| 20 | \$5.30 | | |
| Coke Tin | \$5.12 | \$5.25 | |
| ditto Terns, | \$4.75 | | |

all ordinary brands, large lots.

EXPORTS

*Of Hardware, Iron, Machinery, Metals,
&c., from the Port of New York, for the
Week ending Jan. 7, 1879:*

| Copenhagen. | | British West Indies. | |
|----------------------------|--------|-----------------------------------|--------|
| Quan. | Value. | Quan. | Value. |
| Pumps, pkgs., 10 | \$345 | Hdw., cs., 24 | \$376 |
| Danish West Indies. | | Mf. iron, pkgs. 1 | 66 |
| Nails, kegs, 15 | 6 | P'd ware, cs., 2 | 81 |
| Hdw., cs., 13 | 952 | Car mlts, pgs. 14 | 60 |
| Ag. imp., pkgs. 18 | 179 | Tinware, cs., 5 | 64 |
| Hamburg. | | Nails, pkgs., 14 | 333 |
| Mach'y, cs., 53 | 5,575 | New Zealand. | |
| Pumps, pkgs., 4 | 110 | Mach'y, pgs., 139 | 14,574 |
| Hdw., cs., 60 | 1,160 | Car mlts, pgs., 4 | 1,322 |
| Iron rolls, cs., 2 | 340 | Revolver, cs., 1 | 405 |
| Mf. iron, pkgs. 13 | 260 | Mf. iron, pkgs., 101 | 835 |
| Ag. imp., pkgs. 5 | 219 | P'd ware, cs., 5 | 677 |
| Bremen. | | Ag. imp., pkgs. 36 | 360 |
| Mach'y, cs., 55 | 800 | Nails, cs., 81 | 685 |
| Tinware, cs., 19 | 500 | British Possessions | |
| Ag. imp., pkgs. 11 | 260 | In Africa. | |
| Mf. iron, pkgs. 7 | 252 | Ag. imp., pkgs. 110 | 1,520 |
| Antwerp. | | Mf. iron, pkgs. 54 | 645 |
| Mach'y, cs., 1 | 150 | Nails, kegs, 61 | 205 |
| Dutch West Indies. | | Hdw., cs., 140 | 3,105 |
| Hdw., cs., 34 | 430 | United States of Colombia. | |
| Pumps, pkgs., 3 | 76 | Brass t'bes, cs. 12 | 1,500 |
| Nails, kegs., 21 | 55 | Nails, cs., 2 | 42 |
| Mf. iron, pkgs. 6 | 105 | Arms, cs., 3 | 695 |
| Rotterdam. | | Revolver, cs., 1 | 405 |
| Hdw., cs., 3 | 1,939 | Mf. iron, pkgs. 43 | 476 |
| Ag. imp., pkgs. 32 | 1,375 | Cutlery, pkgs., 14 | 439 |
| Bristol. | | Iron, pkgs., 72 | 113 |
| Hdw., pkgs., 13 | 43 | Nails, kegs, 1 | 405 |
| Glasgow. | | Mach'y, cs., 53 | 3,801 |
| Hdw., cs., 12 | 661 | P'd ware, cs., 5 | 397 |
| Liverpool. | | Copper, cs., 2 | 72 |
| Mach'y, pgs. 85 | 3,579 | Brass tubes, 62 | 260 |
| Cop. w're, bbls. 1 | 1,405 | Cartridges, cs. 4 | 138 |
| Mf. iron, pkgs. 13 | 188 | Fence w're, 119 1/2 | 1,007 |
| Ag. imp., pkgs. 12 | 1,000 | Hdw., cs., 90 | 3,353 |
| Wire w're, pgs. 10 | 2,560 | Powder, lbs., 102 1/2 | 209 |
| China. | | Brazil. | |
| Hdw., cs., 9 | 180 | Mach'y, cs., 76 | 7,951 |
| Mach'y, cs., 4 | 276 | Pumps, pkgs., 20 | 1,360 |
| Cuba. | | Tinware, cs., 3 | 155 |
| Nails, kegs., 58 1/2 | 1,757 | Mf. iron, pkgs. 42 | 761 |
| tin, bxs., 10 | 75 | P'd ware, cs., 5 | 702 |
| Mf. iron, pkgs. 139 | 1,535 | R.E.M.'s, pgs. 31 | 3,650 |
| Ag. imp., pkgs. 7 | 500 | Barrows, cs., 404 | 800 |
| Hdw., pkgs., 123 | 186 | Revolver, cs., 1 | 405 |
| Account, 1 | 860 | Car mlts, pgs. 22 | 3,345 |
| Ag iron, tons., 50 | 880 | Cutlery, cs., 9 | 1,015 |
| Coal, tons., 1,000 | 2,812 | Wire, pkgs., 92 | 1,121 |
| Mach'y, pkgs. 13 | 2,047 | Venezuela. | |
| Cutlery, bbls. 1 | 100 | Irons, pkgs., 23 | 91 |
| Pump, pkgs., 1 | 80 | Revolver, cs., 53 | 1,001 |
| Iron safe, 1 | 410 | Mf. iron, pkgs. 7 | 254 |
| Porto Rico. | | Ag. imp., pkgs. 7 | 62 |
| Hdw., pkgs., 20 | 667 | Mach'y, cs., 6 | 101 |
| Acid, coils., 10 | 220 | Barrows, 56 | 180 |
| Mach'y, pkgs. 5 | 739 | Mexico. | |
| Nails, kegs., 25 | 57 | Nails, cs., 2 | 60 |
| Ag. imp., pkgs. 9 | 124 | Revolver, cs. 3 | 676 |
| Haiti. | | Pumps, pkgs., 4 | 66 |
| Mf. iron, pkgs. 49 | 225 | Brass t'bes, 1 | 88 |
| | | Iron rolls, 3 | 84 |
| | | Hdw., cs., 48 | 912 |
| | | Cartridges, cs. 1 | 70 |
| | | Met'g. g'd, cs. 2 | 365 |
| | | Mf. iron, pkgs. 60 | 102 |
| | | Nails, kegs., 10 | 28 |

IMPORTS

*of Hardware, Iron, Steel and Metals into
the Port of New York, for the Week ending
Jan. 6, 1878 :*

Hardware.
 Baker Hermann & Co.
 Cutlery, pkgs., 19
 oomfield & Co.
 Guns, cs., 2
 oockhahn Wm.
 Cutlery, cs., 1
 les T. J.
 Gun stocks, pkgs., 3
 utters J.
 Wire, bxs., 1
 ch Bros.
 Cases, 1
 ore's John P. Sons,
 Gun caps, cs., 4
 Kinless J. A.
 Packages, 4
 yer & Geiger
 Cartridge boxes, 1
 overling & Daly,
 Guns, cs., 2
 rd Asline,
 Cutlery, cs., 3
 ebusch & Hilger Hdw.
 Co.
 Anvils, Cutlery and
 Hdw., pkgs., 128
 er
 Cutlery, cs., 5
 Bales, 5
 Bundles, 60
Iron.
 lins & Co.

Bars, 2338
 Naylor & Co.
 Pig, tons, 36
 Spiegel, lots, 1
 Order.
 Bundles, 220
 Sheet, bdls., 105
 Spiegel, lots, 1
 Spiegel, tons, 200

Steel.
 Brown William,
 Cases, 17
 Bundles, 248
 Sanderson G. & Co.
 Mds., 1
 Order.
 Rods, bdls., 52

Metals.
 Baring Bros.
 Tin slabs, 504
 Brown Bros.
 Tin slabs, 866
 Naylor & Co.
 Tin plates, bxs., 598
 Pratt C. & Co.
 Tin plates, bxs., 537
 Phelps, Dodge & Co.
 Tin plates, 5886
 Order.
 Lead, pigs, 1260
 Spelter, plates, 849

OLD METALS, PAPER STOCK, &c.

Trade in this market still continues with activity. There is little call from consumers for any description of stocks, and sellers have not much prospect of doing any business before or about the 20th of January. There have been some slight changes in prices made in quotations.

| | | | | | |
|--|---------|---------|---|------|--|
| The purchasing prices offered by dealers | | | | | |
| Old Metals are as follows : | | | | | |
| Copper, heavy..... | per lb. | \$o. 1 | @ | .... |  |
| " per Bottom..... | " | .10 | % | .... |  |
| Bronze Metal..... | " lb | .08 | % | .... |  |
| Zinc, heavy..... | " | .09 | % | .... |  |
| " ss, light..... | " | .08 | " | .... |  |
| Composition, heavy..... | " | .11 | % | .... |  |
| " do., solid..... | " | .09 | " | .... |  |
| Lead..... | " | .02 | % | .... |  |
| " | " | .03 | % | .... |  |
| Night Iron..... | " | .10 | " | .... |  |
| Tin, No. 1..... | " | .08 | " | .... |  |
| " do., No. 2..... | per ton | \$76.00 |  | .... |  |
| Cast do..... | " | 9.00 | @ | .... |  |
| Sheet Plate..... | " | 9.00 | @ | .... |  |
| Machinery do..... | " | 11.00 | @ | .... |  |
| Rails & Bars..... | " | 3.00 | @ | .... |  |
| The prices current for Rags, &c., are as follows : | | | | | |
| Woolen Linen..... | per lb. | 3 c. | @ | 3½c. | |
| " Cotton, New..... | " | 4½c. | @ | 5c. | |
| " " No. 2..... | " | 1½c. | @ | 2c. | |
| " " No. 1..... | " | 3½c. | @ | 3¾c. | |
| " " No. 2..... | " | 2 c. | @ | 2½c. | |
| Ends..... | " lb. | 1½c. | @ | 2 c. | |
| and Wood..... | " | 2 c. | @ | 3 c. | |
| do..... | " | 1½c. | @ | 7 c. | |
| by bagging..... | " | 3 c. | @ | .... |  |
| " | " | 3 c. | @ | .... |  |
| butts..... | " | 2½c. | @ | .... |  |
| ucky bagging..... | " | 2 c. | @ | .... |  |
| Stock..... | " | 2½c. | @ | .... |  |
| Sappers..... | " ¼ c. | 1½c. | @ | .... |  |

| | |
|-----------------------------|---------------|
| Waste Paper and Scraps..... | 1/2 c. @ |
| Kentucky Bale Rope..... | 4 c. @ |
| Tarred Shaking..... | 1 c. @ 1/2 c. |
| Grass Rope..... | 2 1/2 c. |

COAL.

Trade during the past week has been very good. The small stocks in the yards and among consumers, combined with the increased domestic demand occasioned by the severe weather, have greatly stimulated the market. In addition to this, the heavy snows and extremely cold weather at the mines, have reduced the production very materially. Indeed, from some districts we hear that only a quarter of the usual tonnage has been sent down. Owing to various causes, there has been considerable delay in shipments. During the latter part of last week, high winds made it almost impossible to move boats in the harbor, while the formation of ice was so rapid as to greatly interfere with harbor towing since that time. Most of these troubles are now over, but we still hear of complaints from the dealers that they cannot get coal.

Prices are firmer, and on some sizes full quotations are actually obtained. The domestic sizes are scarce. Chestnut is especially so, and its price is fully up to quotations, as is that of Lehigh Lump. The other sizes seem to be shaded somewhat. The market, however, seems to be gaining strength, and it is quite possible, should the cold weather continue and the same difficulty be met in making shipments, that the quotations will be fully realized.

Owing to ice and the roughness of the weather, freights eastward have taken a jump upward. During the worst of the weather the past week, \$2 was asked to Boston, but with a return of better weather, it has dropped to \$1.75. To Providence \$1.25 has been asked, though at the moment of going to press \$1.15 is the highest quotation. We believe that in one instance this latter price was paid. New Haven is frozen up, and freights are merely nominal. When the harbor opens we shall expect the price to drop very considerably.

The talk of a combination still goes on, but, until the companies have more inducement than at present to enter one, it seems hardly likely that there will be any serious steps taken in that direction. Much of the talk about a combination seems to us as intended more for the customer than for any real purpose of uniting the companies. Taken in all its aspects, the trade seems now to be in a very satisfactory state, both for producer and consumer. It is reported that next week there is to be a reduction of tolls upon the Lehigh Valley, and that after that takes place more Lehigh will come to market.

PHILADELPHIA.

Office of The Iron Age, 220 South Fourth St., PHILADELPHIA, Jan. 7, 1919.

The year opens with a quiet but confident feeling in business circles, and although prices of some descriptions of iron seem to be rather unsettled, there is no expressed fear of any important decline. Inquiries for Machinery and Machine Tools indicate a satisfactory spring trade, and in almost every direction we hear expectations of better times. At the Baldwin Works a very important order has been received since the first of the year, and they are kept pretty actively employed, notwithstanding their large capacity. We are not at liberty to name the particulars, but may state that orders for about 20 locomotives have been received during the past week.

There are but few changes in firms or partnerships to notice this year. In the case of Mr. A. A. Konigsmacher, the Iron trade has lost one of its most respected members. For upward of 25 years he was connected with the firm of Caben & Co., and leaves behind him a character which is an honor to the trade.

The firm of Caben & Co. now consists of Francis Von A. Caben and Horatio B. Beatty.

Mr. David Reeves, son of the late S. J. Reeves, has been elected president of the Phoenix Iron Company.

Mr. Percival Roberts, Jr., has been admitted into the firm of A. & P. Roberts & Co. of the Pecos Iron Works.

Mr. Wm. Atkins, of Pottsville, Pa., has been admitted partner in the firm of J. F. Bailey & Co.

Pig Iron.—The year opens with a quiet feeling, and with some degree of doubt as to the immediate course of the Iron market. A larger and a more healthy business seems to be anticipated as the season advances, but, in the meantime, there is the same cautious disposition among buyers as noticed during the past year. All idea of an immediate advance has been thoroughly dissipated by the unsettled condition of the Coal trade, and purchases of Pig Metal will probably be postponed, as far as possible, until the market assumes some definite complexion. According to the figures presented last week, there seems to be no margin for profit, even at the best figures quoted; but a reduction in the price of Coal, equal to 50¢ per ton on Iron, being announced to-day, leads buyers to expect a corresponding reduction to them. It has been understood that the furnaces have had special rates on Coal during last season, and that the decline for that reason, so far as they are concerned, is valueless. In any case, the effect on the market is seen in an indisposition to purchase unless concessions are made, and, for the time being, business is inactive and unsettled. Aside from the Coal question, a more cheerful feeling is manifested, and, when prices become fairly established, a steady and increasing demand is looked for. Prices are nominally unchanged, but transactions, since the holidays, have been few in number and trifling in character. The fact of additional furnaces being put in blast is discouraging as regards prices, and, as the largest consumers are fairly supplied with stock, they are not likely to come in to the market at present, unless inducements are offered. Notwithstanding the apparent steadiness of holders at this writing, the indications seem to favor lower prices; a steady production is going on, and unless consumers are, by their needs, forced into purchasing, in a somewhat unexpected manner, it is difficult to see how the market can be sustained. The question of cost appears

to have little effect upon prices, and so long as furnaces continue to supply Iron without regard to cost, just so long will the market remain in the same unsettled condition as during the past year. The hope of improvement seems to be based upon expectations of increased demand, which, of course, is the surest remedy for a sick market. The point of uncertainty is, whether the demand will come in time to prevent the shading in prices, which, at present, seems far from improbable. We are informed that a sale of 2000 tons Forge Iron has been effected at the full market price, and that there are numerous orders ready to be placed at prices a fraction below the asking rates. In the meantime, sales of small lots are reported at \$17 @ \$18 for No. 1 Foundry, \$16 for No. 2 Foundry, and \$15 @ \$15.50 for Gray Forge, with a fair degree of firmness among holders.

Muck Bar.—No sales reported; \$30 @ \$33, according to quality, is the usual asking price for Philadelphia delivery.

Blooms.—Are very dull, and no sales of any importance have been reported for some time past. Quotations are nominally as before, viz.: Blooms (246 lb), \$38 @ \$39; Northern Ore Blooms (224 lb), \$33 @ \$37; best quality Charcoal Billets (2240 lb), for wire and steel purposes, \$58 @ \$60; Bars do., \$62.50 @ \$65; Sheet Iron Blooms, cornered (246 lb), \$53 @ \$55; Cold-blast Charcoal Plate Blooms, \$50 @ \$53; run-out Anthracite, \$45 @ \$47.50.

Structural Iron.—The year opens with a feeling that business will be active, and although only small lots have been placed so far, the outlook, as to demand, is said to be quite encouraging. Prices are not particularly firm, however, and it is not unlikely that immediate orders of a desirable character would be accepted at as low rates as were current at any time during 1918. There has not been enough done since the holidays, however, to indicate what shape the market will take, and the large capacity for production, in the opinion of the trade, seems to quite offset the expected large demand. Sellers are thoroughly alive to new business, and sharp competition is met with in the case of desirable orders. The only contract reported, so far, is one of about 300 tons for a bridge near Toledo, Ohio. Prices are said to be very low, and indicate a keen desire for business by the parties who secured the order. We quote: Angles, 2.1¢ @ 2.3¢; Tees, 2.3¢ @ 2.4¢; Beams and Channels, 2.6¢ @ 2.8¢, according to specification.

Plate and Tank Iron.—The demand for small lots is quite active, and prospects of a large trade are thought to be fairly encouraging. Sales amounting to several hundred tons have been made since the first of the year, but prices show signs of weakness, and most of the business has been done at inside figures. The mills are anxious to secure a reasonable amount of work to start on, anticipating an improvement in prices later on. In the meantime all that can be said with certainty is, that competition is very sharp, and nothing but a large demand is likely to sustain the market. Such a demand is one of the things hoped for, and with the favorable outlook generally, such an anticipation is probably well founded. We quote Common Plates, 2.1¢ @ 2.3¢; Tank Iron, 2.3¢ @ 2.5¢; C. No. 1, 2.4¢ @ 2.6¢; Shell Iron, 2.75¢ @ 2.9¢; Flange Iron, 3.7¢ @ 4¢; Solid Firebox, 4.85¢ @ 5¢, and Best Bloom, 5.5¢ @ 6¢.

Sheet Iron.—There is a fair demand, considering the season, and a greater willingness to buy quantities than usual. Sellers have not quite made up their minds what course to take; the result of the last year's business has proved very unsatisfactory to many manufacturers, and they are looking to see if higher prices cannot be obtained. Buyers do not respond at all freely to such demands, and are not likely to do so in a dull season, except for such small lots as may be absolutely required. On the other hand, manufacturers want a few good orders to start their mills on, so that it is quite likely that the market for large lots will open at about the closing prices of December, while small lots will probably command a small advance. We quote for retail lots as follows: Common Sheet, No. 20 to 23, 2.9¢ @ 3¢; No. 24 to 26, 3¢ @ 3.1¢; No. 27 to 28, 3.2¢ @ 3.3¢; Best Refined Sheet, No. 25 to 28, 3.3¢ @ 3.4¢; No. 22 to 24, 3.2¢ @ 3.3¢; No. 16 to 21, 3.1¢ @ 3.2¢; Best Bloom Sheets, No. 25 to 28, 5.2¢ @ 5.3¢; No. 22 to 24, 5.1¢; No. 16 to 21, 4.8¢ @ 4.9¢; Refined Plates or Blue Annealed, 5.1¢ to 16, 2.4¢ @ 2.5¢; American, R. G., 5.1¢ to 16, 3¢ @ 3.1¢; Best Bloom, 5.1¢ to 16, 4.9¢ @ 5¢; A Patent Planished, 10.5¢ @ 11¢; Patent Planished, 9.5¢ @ 10¢; Best Bloom Galvanized, 45¢ discount; second quality, 55¢; extra discounts for large lots.

Bar Iron.—A better feeling seems to prevail, and two or three lots of upwards of 200 tons each have been taken since the opening of the year at the full prices current during the past month. Several of the mills appear to be well supplied with orders, which, although at low prices, probably, for the time being, has taken them out of the market. There is an expectation of a heavy demand during the spring, and as stocks are low buyers are endeavoring to place their orders, whenever they can do so, to advantage. There are still some complaints of dullness, but the belief in a larger volume of business, whether well founded or not, is almost universal. In course of a week or ten days the market will probably become more settled, but at present the outlook is considered brighter than it has been for a long time past, and manufacturers and merchants take a decidedly hopeful view of matters. Prices are unchanged. Common Iron, at 1.5¢ @ 1.6¢; Fair to Good, 1.7¢ @ 1.8¢, and Best Refined, 1.9¢, firm.

Steel Rails.—There is nothing specially new to report. Business seems to drag a little, but, as the mills have a large amount of work on hand, they are not disposed to force sales, although prompt cash would probably lead to concessions from asking rates. An order for 10,000 tons, for the Northern Pacific Railway, has been placed with two of the Pennsylvania mills, and other buyers are in the market, ready to enter into contracts as soon as prices are made to meet their views. Some prominent roads are holding back, under the impression that they will be able to make better terms

later on; but as there is a pretty steady demand for small lots, manufacturers are somewhat indifferent about large orders, unless prices and terms are made reasonably satisfactory. We quote, \$42 @ \$44, at mill, according to location, as the usual asking price, the 10,000 tons to the Northern Pacific having been sold upon this basis.

Iron Rails.—The market continues steady and firm, with several sales of small lots, and inquiries for lots amounting in all to 8000 or 10,000 tons. Most of these will probably result in actual business in course of a few weeks, but there is usually a considerable amount of preliminaries before definite arrangements can be made. Sellers are more than ever disposed to insist upon cash or unquestioned security before accepting orders, which may be regarded as evidence that the trade is in a healthy condition. A large business has been done in light Rails for export, and although at the moment there is less demand than there was a month or two ago, further orders of that class are looked for at an early date. We quote: \$32.50 @ \$35, at mill, according to location, quality of Rail, terms of payment, &c.

Old Rails.—The market is active and so bare of stock that quotations for spot lots are difficult to make. It is likely that upward of \$20 could be obtained for a fair average quality, although one or two small lots have been sold at that figure. Buyers are anxious to fill their orders, however, and \$20 @ \$20.50 would no doubt be readily paid for prompt deliveries. Sales since the first of the year by Philadelphia parties amount to over 10,000 tons, as follows, f. o. b. New York, \$18.75; on cars at Harrisburg, \$21, and several thousand tons delivered in Pittsburgh at \$22.50 @ \$23.50. Market very firm, latest sales reported being at \$23.50.

Scrap Iron.—The market is a little quiet, but prices are steadily maintained, and good qualities command full prices, say, Wrought, \$20 @ \$22.50; Cast, \$14 @ \$15; Steel Springs about \$34 @ \$35.

Nails.—There has been quite an active demand, and large sales are reported at very slight concessions from quoted rates. There is more firmness among holders than we have noticed for months past, and it is quite likely that bottom has been reached. We quote 2.10¢ as the rate for large lots.

PITTSBURGH.

Office of The Iron Age, 77 Fourth Avenue, PITTSBURGH, PA., Jan. 7, 1919.

The extreme cold weather of the past two weeks, which appears to have prevailed throughout the entire country, has had a bad effect upon general business, which is nearly always dull during the time in question. With the thermometer from 6 to 14 degrees below zero, it is not to be expected that anyone would give much attention to anything, excepting to keep themselves warm. Not only has the cold weather interfered with ordinary business, but it has kept back the work of taking stock and annual repairing, so common at this particular time. The only favorable feature to note in connection with this cold snap, the like of which has not occurred for several years, is that country roads are in good condition; and, as soon as it moderates somewhat, farmers will commence to dispose of their products, in order to obtain means to purchase such articles as they are in want of, and business will soon be benefited thereby. Bad roads have more to do with business than people generally have any idea of, and with good "sledding," stock taking accomplished, specie payments resumed, and nothing politically to disturb or distract the country, there is no reason why trade in nearly all its varied departments should not soon give evidence of a decided and healthy improvement.

In regard to the general Iron trade, the outlook is considered favorable for an increased business this year, as compared with 1918, and it is hoped and expected that more remunerative prices will be obtained. Your correspondent last week interviewed a number of our most prominent operators, and without an exception, they all expressed themselves hopefully in regard to the future—some of them, as might be expected, more so than others. This important interest in the West is in better condition, in some respects, than it has been at any time since the panic. Most of those firms whose credit was impaired, and who were obliged, in order to raise funds, to sacrifice their products, have been wiped out, and more remunerative prices are expected in consequence. Indeed, it is worthy of notice that the market has been much firmer for some months past, and consumers, as well as producers, have commenced to think that hard pan has about been reached. The Western Iron and Nail Associations meet here this week, and if anything important is developed, The Iron Age will be duly advised by telegraph.

Pig Iron.—Business has been very dull the past week, but there is considerable inquiry. A good many "trial lots" are out, which, it is believed, will result in a good deal being sold within the next few weeks. Our commission merchants are hopeful of the future, not only of an increased business, but of better prices. One of them, on being questioned in regard to the latter, replied that he did not look for any immediate improvement in the lower grades, as, according to his belief, the production was in excess of the consumption; but, as the stock of Standard Mill Irons was small and the production light, he looked for these to bring an advance soon. Consumers, as a rule, have very little stock, and as soon as they all get started up again, an increased demand appears inevitable, and on this sellers base their faith largely of better prices. The cost of production has been reduced to the very lowest possible limit, and but few buyers even expect Pig Iron to rule below current rates. Few of the furnaces in blast are forced to sell as best they can, in order to raise money, as was the case until within the past year, and in this important particular the market is in better condition than it has been for some years past. These crippled furnaces have been the main cause of the unremunerative prices that have pre-

valled, as they were obliged to sell in order to raise money, and they thereby established a price which others had to accept, if they wanted to sell. Now, however, the situation is different; most, if not all, of these weak and disabled furnaces have been wiped out, and those who have weathered the storm are not forced to realize, but able to hold for full market price. Stocks in first hands in the West are light, as nearly all the furnaces in blast have been working on orders, and producers, as a rule, have made it a point for a year or more past not to accumulate. Bituminous Coal Smelted Irons, \$18.50 @ \$20, 4 mos., for Foundry, and \$17.50 @ \$19.50 for Mill, the outside figure for all ore Red-short. Coke Irons, \$16, cash, @ \$16.50, 4 mos., for Mill, Eastern Cold-blast Charcoal selling all the way from \$29 @ \$32, 4 mos., according to quality. Bessemer Iron nominal at \$20, 4 mos. No sales reported for some time. Charcoal Bloom \$50 @ \$60.

Manufactured Iron.—At the present time business is dull; stock-taking, annual settlements and making repairs, appear to be absorbing the time and attention of our manufacturers just now more than anything else. They are anxious to ascertain to a certainty whether they made or lost money during the year so recently closed, and until satisfied on this important point, they will not make much effort looking toward new business. Moreover, as current rates afford no margin and an advance soon is not improbable, manufacturers are not solicitous about business, and it is doubtful if large contracts could be made either for present or future delivery at prevailing prices; indeed, the policy of makers just now is to sell only small lots to regular customers, from which it is evident, as already stated, that an advance soon is expected. We continue to quote on a basis of 1.75¢, 60 days, for Bars, with the usual two per cent. off for cash. Another meeting of the Western Iron Association takes place here this week, when the proposed new card will again be discussed, and possibly it may be adopted.

Nails.—There is nothing particularly new to report, excepting a probability that the proposed pooling system is likely to fall through, the Wheeling manufacturers generally, although favorably impressed with it at first (and it was there that it originated), it is understood, are not now disposed to go into it. It is believed that the proposed arrangement would have a good effect if faithfully and energetically carried out, but so many arrangements have been tried within the past few years and failed, that the trade generally have lost confidence in them. The recent advance, however, is fully maintained, and a further advance is not improbable between now and the opening up of the spring trade. We continue to quote at \$2.05, 60 days, for lots of 200 kegs and upward, with the usual 2% off for cash.

Rails.—Steel Rails are quoted steady at \$43.50 @ \$44, cash, delivered free on cars in Pittsburgh. Old Iron Rails firm, in light supply, and with some inquiry; prices are tending upward; sale of 2500 tons at \$23.50, cash. It is reported that some of the Wheeling Nail factories are in the market for old Rails. Steel Rail Ends and Steel Bloom Ends, \$28 @ \$32, cash at mill, according to lengths; Steel Blooms, \$42 @ \$45; do. Billets, \$44 @ \$47, cash at mill, according to carbons.

Wrought Iron Pipe.—Business is still reported dull, but an increased demand this month is expected. No change in discounts; 35 and 40 off new card, on Gas, Water and Steam Pipe, and 40 on Boiler Tubes. It is reported that in the East a larger and better discount is being offered on Boiler Tubes. The butt welders were to have held a meeting in Philadelphia yesterday, and the lap welders were also to have met there on the 9th, but it is understood that the latter meeting has been postponed one week.

Steel.—The demand for all kinds of Steel is light just now, as it always is at this particular time, but it is expected that orders will soon commence to come forward freely. There is every indication that the business of this year will be fully equal to that of 1918 in point of volume, and manufacturers are hopeful of being able to secure better prices.

Scrap.—The movement in all kinds of Scrap has been light for some weeks past, but an increased demand is expected within the next week or two. No change in prices, which are believed to be down to bottom. No. 1 Railroad Wrought, \$21 @ \$22, net; Old Car Wheels, \$18.50 @ \$19.50, gross; Cast Borings, \$10.50 @ \$11; Wrought Turnings, \$14 @ \$15, net; Blacksmith Scrap, \$20 @ \$21; Boiler Scrap, \$21 @ \$22; Car Axles, \$27 @ \$28; Car Springs, \$30 @ \$31.

Coke.—The market continues firm, with no apparent abatement in the demand, and this being the case prices, as might be expected, are still tending upward; we now quote at \$1.25 @ \$1.30 per ton, delivered free on cars, at the mines. The consumption the past year was the largest, probably, in the history of the trade, and the indications are that the demand this year will exceed that of 1918.

Coal.—The continued cold weather is favorable to the Coal trade. Those of our operators who have Coal in the down-river markets have no fault to find with the situation. In addition to cutting off the source of supply, the cold snap will largely increase the consumption, and prices will advance, if not already advanced, at points in question. Those operators who ship by rail have orders for about all the Coal they can furnish, and prices are firm and tending upward. We now quote at 4 1/2¢ @ 5¢ per bushel, delivered free on cars at works.

Window Glass.—Business in this important interest is dull, with no decided improvement expected before the middle of next month, when the spring trade usually commences to open up. The business of 1918 exceeded that of any former year probably since the panic, in volume, but there was very little money made. No change in prices. We continue to quote at 70 and 75 to 70 and 10¢ off by the car load, and about 75¢ in a jobbing way.

Petroleum.—The market, contrary to general expectation, has stiffened up mate-

rially since the first of the year, and prices, both on the raw article and the product, have advanced. The business of Pittsburgh this past year was the largest, probably, in the history of the trade. The Standard Oil Co., which owns and controls about nineteen-twentieths of the refining capacity of Pittsburgh, report their business for the year as follows:

| Shipments of Refined. | Gallons. | Bbls. |
|-------------------------------|------------|-----------|
| To Philadelphia..... | 34,546,995 | 829,346 |
| " Baltimore..... | 3,529,050 | 361,007 |
| " New York..... | 8,613,500 | 203,083 |
| Local..... | 3,800,000 | 90,476 |
| Total..... | 70,529,475 | 1,679,166 |
| Total crude oil received..... | 69,621,338 | 2,133,846 |

CHATTANOOGA.

Office of The Iron Age, Market and 8th Sts., CHATTANOOGA, Jan. 4, 1919.
Business during the past week has had two or three drawbacks to contend with—cold, mud and holidays. The latter has helped the sale of "small traps," and hindered all heavy trade. Despite these hindrances, inquiry for some lines of metals has been in excess of the same week in the past, and purchasers find it more difficult each succeeding day to purchase at present quotations. The week began with biting cold weather; in the middle it was raw, muddy, and exceedingly disagreeable. At the end—Friday and Saturday—we have the coldest weather felt in this valley for several years.

Pig Iron.—The demand is rather better, though the intense cold impedes business. There is especially an improved demand for Car-wheel metals. We quote: Coke Irons, No. 1 Foundry, \$17.50 @ \$18; No. 2, \$15.50 @ \$16; Gray Forge, \$13.50 @ \$14; White and Mottled, \$11.50 @ \$12. Hot-Blast Charcoal—No. 1 Foundry, extra, \$20 @ \$21; ditto, \$18 @ \$20; No. 2 Foundry, \$16 @ \$18; Gray Forge, \$15 @ \$17; White and Mottled, \$15. Cold Blast Charcoal—Car Wheel Metal, \$22.50 @ \$27.50; do., Extra Standard, \$24 @ \$29.50; Forge, \$17 @ \$22.

Muck Bar.—\$27 @ \$34. Old Rails, \$18 @ \$18.50. Old Car-wheels, \$18.

Ores.—Brown Hematite, 50 to 56%; per ton, \$1.75 @ \$2.25. Red Fossiliferous, 50 to 56%; per ton, \$1.70 @ \$1.90. The above prices for ores delivered in Chattanooga on cars, or on the wharf from flat boats.

Nails.—There is no change in the Southern market, though the demoralization seems to have come to an end, and the trade is rapidly settling down to a steady condition. We quote at \$2.25 rates, with usual discount on job lots.

Manufactured Iron.—The mills have all they can do. They were kept going double turn nearly all the holidays. There is no change in price, but products and stocks are held strongly. We quote Bar at \$2; Railroad Spikes, \$2.50; Light Rail, \$2.25; Track Bolts, \$3; Trestle Bolts, \$4.

Coke.—Washed foundry, 13¢ to 15¢ per bushel, free on cars in Chattanooga. Furnace Coke in full supply at \$2 @ \$2.50 per ton.

Coal.—There is a lively trade. Prices sharply stiffened by the cold weather. We quote: Strictly Lump at 12¢ @ 14¢, delivered. Run of mine to manufacturers, \$1.50 @ \$1.75 per ton.

Pig Lead.—From local mines 4¢.

Ingot Copper.—The slight advance realized is maintained. We quote at 18¢.

Iron Rails.—The demand is fair, mostly for rerolling. Holders are firm at \$34 per ton.

BOSTON.

JAN. 5.—Pig Iron continues in light demand, and this will probably be the case for some time to come. At the shipping ports Foundry No. 1 is quoted at \$16.50 @ \$17; Foundry No. 2, \$16.50 @ \$17.50; Gray Forge, \$14.50 @ \$15.50. There is nothing new in the market for Scotch Pig. Engleton is still held at \$22.50, Glengarnock at \$24, Gartsherrie at \$25 and Coltness at \$26. Another decline abroad is called this week. Nails have been in fair demand, jobbing now at \$2.25 @ \$2.30. For 100-keg lots \$2.20 is the price. Sheet is selling at 3¢ @ 3 1/2¢ per lb. Russia is quiet at 10 1/2¢ @ 11¢. We quote English Spring Steel at 7¢ @ 8¢, gold; 8¢ @ 11¢ for German; 9¢ @ 11¢ for Machinery; 14¢ @ 15¢ for Cast; 10¢ @ 12¢ for Blister; 8¢ for American Spring; 13¢ @ 13 1/2¢ for Cast; 9¢ for Blister, and 7 1/2¢ @ 8¢ for Machinery. In Plate Iron there continues to be a fair degree of activity in Tank, which is selling steadily at 2 1/2¢. Boiler Plate is very dull, quoting 2 1/2¢ for No. 1 Charcoal; 2 1/2¢ @ 2 3/4¢ for No. 1 Shell, and 3 1/4¢ for Flange. Merchant Bar jobs at \$1.65 @ \$1.75. Copper rules dull, with light sales on the basis of 16¢ for Lake. For manufacturers we quote: New Sheathing at 24¢ @ 26¢. The outside price rules in small transactions, but large buyers are purchasing at the inside figure. Bolts are quoted at 26¢ @ 28¢. Yellow Metal Sheathing continues easy, quoting 12 1/2¢ @ 13¢ for English, and 13¢ @ 13 1/2¢ for American; Yellow Metal Bolts, 18¢ @ 20¢. Lead is steady, and there is a trifle firmer feeling. We quote: Pig, 4 1/2¢ @ 4 3/4¢; currency, Sheet, 5 1/2¢; Pipe, 4 3/4¢; Lin. Lined Pipe, 12¢; Bar Lead, 4 3/4¢; all of these excepting Pig are subject to the usual trade or 10% discount. Antimony is in light demand, but is steady, and we quote 12¢ @ 12 1/2¢. Spelter is dull, being held at 4 1/2¢ @ 4 3/4¢ for the various grades. Tin is dull and easy. We quote: Straits, 15 1/2¢ @ 15 3/4¢; Banca, 18¢; Refined English, 15¢ @ 15 1/4¢; gold. We quote Plate: Charcoal, I. C., \$5.75 @ \$6; Coke, \$5 @ \$5.25; and Charcoal Terme, \$5.40 @ \$5.50, gold.—Commercial Bulletin.

CINCINNATI.

Messrs. E. L. HARPER & Co., under date of Jan. 6, write us as follows: Confidence in the future has been greatly increased by the complete success of resumption of specie payment by the national government. Unquestionably trade has been getting upon a more solid and satisfactory basis. Failures are much less frequent, and of a less serious

Railroad Construction in 1878.

A tabular statement of the new railroads completed in the year 1878 has been compiled by the *Railroad Gazette*. From the figures which we give below it will be seen that the total has been considerably greater not only than the previous year, but than any year since 1873. At the beginning of 1878, according to Poor's Manual, there were 79,203 miles of railroad in the country, so that according to the data given by the *Railroad Gazette*, there are now 81,806 miles in the United States, or about one mile for 585 inhabitants.

Mileage of New Railroad Constructed in Each State and Territory for Six Years.

| | 1873 | 1874 | 1875 | 1876 | 1877 | 1878 |
|--------------|------|------|------|------|------|------|
| Alabama | 182 | 173 | 174 | 175 | 176 | 177 |
| Arizona | 0 | 0 | 0 | 0 | 0 | 0 |
| Arkansas | 150 | 247 | 18 | 18 | 18 | 18 |
| California | 198 | 18 | 18 | 18 | 18 | 18 |
| Colorado | 105 | 121 | 23 | 111 | 154 | 123 |
| Connecticut | 24 | 25 | 0 | 21 | 7 | 35 |
| Dakota | 210 | 80 | 0 | 0 | 0 | 0 |
| Delaware | 264 | 218 | 19 | 5 | 0 | 0 |
| Florida | 109 | 0 | 18 | 0 | 13 | 0 |
| Georgia | 49 | 122 | 4 | 4 | 0 | 0 |
| Idaho | 0 | 0 | 0 | 0 | 0 | 0 |
| Illinois | 686 | 274 | 231 | 200 | 58 | 103 |
| Indiana | 126 | 84 | 109 | 74 | 21 | 74 |
| Indian Ter. | 149 | 0 | 0 | 0 | 0 | 0 |
| Iowa | 451 | 63 | 48 | 84 | 104 | 255 |
| Kansas | 445 | 18 | 0 | 0 | 0 | 0 |
| Kentucky | 143 | 68 | 31 | 0 | 138 | 20 |
| Louisiana | 143 | 0 | 0 | 0 | 0 | 0 |
| Maine | 694 | 0 | 0 | 0 | 0 | 0 |
| Maryland | 194 | 34 | 12 | 15 | 0 | 5 |
| Mass. | 37 | 117 | 27 | 35 | 5 | 17 |
| Michigan | 571 | 48 | 0 | 0 | 0 | 110 |
| Minnesota | 307 | 48 | 36 | 0 | 34 | 338 |
| Mississippi | 22 | 27 | 0 | 0 | 0 | 0 |
| Missouri | 314 | 235 | 31 | 27 | 109 | 200 |
| Montana | 213 | 41 | 0 | 23 | 52 | 5 |
| Nebraska | 18 | 18 | 40 | 64 | 0 | 0 |
| N. Hampshire | 43 | 10 | 45 | 15 | 18 | 31 |
| New Jersey | 103 | 40 | 39 | 73 | 84 | 81 |
| New York | 435 | 243 | 135 | 236 | 69 | 159 |
| N. Carolina | 65 | 15 | 0 | 0 | 0 | 0 |
| Ohio | 494 | 172 | 123 | 28 | 275 | 250 |
| Oregon | 82 | 0 | 0 | 0 | 0 | 0 |
| Pennsylvania | 551 | 208 | 121 | 159 | 108 | 108 |
| Rhode Island | 0 | 22 | 14 | 0 | 0 | 0 |
| S. Carolina | 88 | 0 | 15 | 17 | 40 | 10 |
| Tennessee | 15 | 114 | 0 | 0 | 0 | 0 |
| Texas | 391 | 385 | 75 | 34 | 30 | 118 |
| Vermont | 57 | 85 | 59 | 27 | 0 | 0 |
| Virginia | 49 | 30 | 70 | 0 | 10 | 10 |
| Wash. Ter. | 40 | 0 | 0 | 0 | 0 | 0 |
| West Va. | 75 | 40 | 0 | 0 | 0 | 0 |
| Wisconsin | 493 | 320 | 102 | 23 | 123 | 83 |
| Wyoming T. | 0 | 0 | 0 | 0 | 0 | 0 |

Total... 7,340 3,883 2,041 1,561 2,450 2,381 2,688

It may be said of the extensions of 1878, that they were parallel with a great increase of production, and an examination of their situation will show that the largest part of them were just where production has recently increased most rapidly and promises to continue to increase, in the immediate future at least. They are chiefly for local traffic, 871 miles, or 33 per cent., being narrow gauge. Minnesota leads this year with its mileage of new road, having completed no less than 338 miles, or 13 per cent. of the whole. This, it is believed, is more than in any previous year, and considering the fact that but a few years ago not one of the Minnesota railroads made large enough profits to pay the interest on its bonds, and that several did not earn their working expenses, it is certainly remarkable. Doubtless it is largely, if not chiefly, due to the abundant wheat crop of 1877, which attracted a heavy immigration and made a market for the fertile Minnesota lands, of which great quantities are owned by railroad companies and by the government. Probably all, or nearly all, these Minnesota roads will have a paying traffic in course of time, but not so soon as if the last harvest had turned out well. There had been a large immigration before the harvest, however, which is likely to add largely to the area in cultivation in 1879.

Among the lines built for through traffic, or for connecting old roads together—of which there has been a considerable number, though most of them are short—may be mentioned the Boston, Hoosac Tunnel and Western, which will give the Erie a favorable connection with Boston and New England; three connections with the New York Central from roads to the south of it, two of which are coal roads; the Pittsburgh and Lake Erie, which will enable the Atlantic and Great Western and the Lake Shore and Michigan Southern to compete for traffic between Pittsburgh and the West; the St. Vincent extension of the St. Paul and Pacific, with the Canadian extension of it to the capital of Manitoba at Fort Garry, which for the first time fairly opens this great undeveloped empire to the world; the Kansas City Extension of the Chicago and Alton, which will give this company a road of its own instead of leasing the St. Louis, Kansas City and Northern for 160 miles, as it has done hitherto; the Atchison, Topeka and Santa Fe and the Southern Pacific, which are rapidly coming together to form a new railroad route to the Pacific; and the Utah and Northern, which is on its way to Montana and likely soon to give that territory its first convenient outlet.

The prospect for railroad extension in 1879 seems good. Between 50 and 60 of the 140 lines built in 1878 are to be extended further in 1879, and among them are such important lines as the Atchison, Topeka and Santa Fe, the Southern Pacific and the Utah and Northern; and of course new lines will be begun. Much will depend on the character of the next harvest. Should that be favorable, considerable activity in the construction of branches may be expected, especially in Minnesota, Iowa, Kansas and Nebraska. On the other hand, should it be unfavorable, immigration will probably be checked, and the construction of many new roads be put off to a more favorable season.

The Distress in Sheffield.

The Sheffield Independent publishes the following, which is full of startling suggestions:

The distress is found to be so great in the town that the Ladies' Committee in connection with the Mayor's Relief Fund, have decided to give employment to 200 women daily at their depot in West street. The women were first employed in parties of 80, but the committee had so many applications for work that, during the present week, they have admitted 100 women daily to the sewing rooms, and yesterday no less than 120 were engaged there in making garments for the poor. Another room has now been provided and fitted up, by Mr. Mark Firth, for the additional number of workers, so that at the commencement of the new year at least 200 women will be able to work at the depot. The ladies, who are carrying on this self-denying labor, are unceasing in their efforts to alleviate the condition of the workwomen, some of whom have suf-

fered fearful privation. Members of the committee, in superintending operations in the workroom, have recently been shocked, pained and surprised to see several of the women fainting through lack of food, yet the workers, although in such terrible straits, preferred to endure their misery uncomplainingly, rather than confess the extremity of their poverty. In some cases the women, becoming so ill that they could not continue their employment, have gone despairingly home, and the ladies seeking them out have found them in the most appalling circumstances, without furniture and fire, and almost without clothing. Only this week one of the workers, who had been unable to attend at the depot in consequence of illness, was visited by a committee lady, who found her in a wretched home, without bed or bedding, and in a condition bordering on starvation. The woman has since been under the care of the Ladies' Committee, who have done many similar acts of kindness to the poor. A large staff of ladies visit the depot daily and take great interest in the work. The committee feel that the necessity for relieving the widely-spread distress is so urgent, that they do not intend taking any holiday except Christmas Day, and have decided to work at the depot during New Year's Day as usual. The decision has been received with great satisfaction by the workwomen, who seem very thankful for the consideration shown them by the ladies.

WESTERN IRON TRADE.

Annual Review for 1878.

Office of The Iron Age, 77 Fourth Avenue, Pittsburgh, Jan. 1, 1879.

The course of the iron trade in the West for the year 1878, expressed in a single sentence, has been a continuation in the decline of prices for the larger part of the year, with a slight improvement at its close; an increased production over 1877; and considerable activity, especially in Steel, in the enlargement of works and the increase of capacity. 1878 marks the lowest point in prices ever known in the iron trade of the country. The decline which began in 1872, continued almost uninterruptedly until, in the summer of 1878, the prices of everything entering into the manufacture of iron in all its forms, with the single exception of labor, as well as of the manufactured article itself, reached a point that it was supposed could never be touched. Lake Superior Ore sold for from \$4 @ \$6.50 per ton at Cleveland; Coke Smelted Neutral Forge Pig Irons touched \$16, and Red Shorts, \$17.50, while Bessemer Pig Irons sold at \$19; Bar Iron has been sold at \$1.60 per 100, and Nails as low as \$1.85 per keg. In the face of these adverse prices, our information is to the effect that there has been an increased output in all kinds of iron. The output of Lake Superior Ore is, with one exception, that of 1873, the largest ever made. The production of all forms of iron, with possibly the exception of Nails, will be found to be larger than in 1877. It is no little to the credit of Western iron manufacturers that they have been able to maintain their position. They have displayed an extraordinary amount of pluck and perseverance, fighting against constant reductions in prices. The years since 1873 have been the most disastrous ever experienced, but in the face of it all the West has kept its position. Had the manufacturers of iron always shown as much judgment and common sense as they have pluck and perseverance, prices would be much more satisfactory to-day.

Connellsville Coke Trade.

Taking the year as a whole, the demand for Connellsville Coke, which is now the favorite fuel for blast-furnace purposes, has been good. The price in January on cars at ovens was about \$1 @ \$1.05 per ton of 2000 lb., or 4¢ @ 4½¢ per bushel of 40 lb. The winter of '77-'78 being a very open one, large amounts were loaded on barges for the river trade, so that the shipments for the spring run of 1878 were the largest ever known, aggregating some 5,000,000 bushels, or 100,000 net tons. From July to October, on account of the low state of water in the Ohio and the numerous failures in the Shenango and Mahoning Valleys, the Coke trade was considerably depressed and demoralized. Consumers changed their orders for the smallest margin, and Coke reached 80¢ per ton. From October the demand has steadily improved, until every oven in the Connellsville region is fired. Prices have recovered. Manufacturers are now daily asking \$1.10 to \$1.15 per ton to foundries. The increased use of Coke in the East, in anthracite furnaces, has had its effect in producing this advance, though the greatly increased production of furnaces using Coke as a mixture, has been ascribed to almost every conceivable thing but the use of Coke. The trade East has, all through the year, slowly but steadily increased, and the promise is that it will be much more extensive at the close of 1879 than at its beginning. The Coke trade, with the exception of that which is shipped to furnaces by the river, is one in which supply and consumption are but a few days apart. Most of the Coke is in blast-furnaces in 72 hours after leaving the ovens, and, as very little stock is carried at furnaces, the trade is of a necessity quickly advanced or depressed, and this makes it difficult to forecast the future. However, it is fair to say that present appearances point to a steady demand, at fair prices, for 1879.

Ore.

By far the greater part of all the Pig Iron smelted in the West with Coke or Bituminous Coal, is made from Lake Superior Ores. It is almost the only Ore used in the Pittsburgh and neighboring districts, the Shenango and Mahoning Valleys and Wheeling. A very small percentage of native Ores, such as the Springfield, Wampum and Fayette County Ores, are used in local furnaces, and some little is brought from the Cornwall mines and some Virginian mines to furnaces in Western Pennsylvania and West Virginia, but the total is very small. More than one fourth of all the Pig Iron smelted in the United States is from Lake Superior Ores. These Ores have been sent in considerable quantities the past year to points east

of Pittsburgh. In the Bessemer process, Pig Irons from these Ores seem a necessity as a mixture to reduce the percentage of silicon, and as a result, there is not a Bessemer works in the country that does not use Pig Iron made in whole or part from Lake Superior Ore. This has made the best grades suitable for Bessemer Pig in good demand the past year, and the absorption of these by the Bessemer furnaces has increased the demand for other grades, so that, as we have already stated, the outlook for 1878 has been the largest, with one exception, of any year in the history of the trade. The *Marquette Mining Journal*, which may be regarded as reflecting the views of the Ore producers, began the season with a warning to consumers that the output for 1878 would be less than 1877. Near the close of the season it was compelled to acknowledge its mistake, and to confess that, in face of lower prices and considerable stocks in the Cleveland docks at the beginning of the season, the output over 1877 was over 100,000 tons, a larger output than any previous year except 1873.

From the *Marquette Mining Journal* we take the following table, giving the total shipments of Lake Superior Ore, by lake and rail, for the season of 1878:

| Name of mine | Gross tons | Name of mine | Gross tons |
|----------------|------------|--------------------|------------|
| Republic | 175,221 | Cleveland hematite | 9,337 |
| Cleveland | 143,480 | Norway | 7,276 |
| Lake Superior | 100,534 | Bessemer | 8,505 |
| Jackson | 83,121 | Goodrich | 7,547 |
| Champion | 73,464 | Cyclops | 6,038 |
| Saginaw | 61,237 | Keystone | 5,401 |
| Michigan | 58,623 | Palmer | 4,704 |
| Salisbury | 52,155 | Breen | 4,694 |
| Vulcan | 38,799 | Marquette | 4,596 |
| McComber | 30,180 | Mitchell | 4,259 |
| Rolling Mill | 30,773 | National | 4,191 |
| Pittsburgh and | | N. Y. hematite | 4,547 |
| Lake Angeline | 28,167 | Cambria | 3,754 |
| Barren | 25,680 | Pendell | 3,383 |
| Quinnes | 25,925 | Spurr | 2,217 |
| Humboldt | 23,920 | Manganese | 2,093 |
| Winthrop | 23,740 | Steward | 1,690 |
| New York | 21,923 | Howe | 1,225 |
| Smith | 15,024 | Morgan | 10 |
| Emmett | 11,521 | | |
| Edwards | 10,351 | Total | 1,124,927 |

The following table, from the same source, gives the total Ore shipped out of the lake region, and the product of the local furnaces. The years 1877 and 1878 are exceptions, the figures given being the actual product of the mines:

| Years | Iron Ore shipments | Production of Pig Iron | Total Ore & Pig Iron |
|-------|--------------------|------------------------|----------------------|
| 1873 | 1,167,379 | 70,507 | 1,237,886 |
| 1874 | 935,688 | 80,494 | 1,016,182 |
| 1875 | 920,543 | 81,753 | 1,002,296 |
| 1876 | 977,233 | 61,211 | 1,038,444 |
| 1877 | 960,982 | 50,685 | 1,011,667 |
| 1878 | 1,124,927 | 18,544 | 1,143,471 |

As stated above, the prices for the season have been \$4 @ \$4.50 for Hematites, and \$6 @ \$6.50 for Magnetites and Speculars. The price of the better grades of the latter, owing to their demand for Bessemer purposes, has been very firm. For the former the market was weak at times, but, on the whole, the price fixed at the beginning of the season was fairly maintained. It is very difficult to forecast the course of the market for the coming year. There is no doubt that the demand for iron for the Bessemer and open-hearth processes will at least absorb all the Ore suitable for this grade that will be mined, and at least enable the present prices to be maintained. The outlook for the demand at the beginning of the season may be so good as to justify something of an advance, but this is by no means to be calculated upon. The new developments, and the extensive improvements and explorations that are being made at some old mines, may result in putting a surplus of Ore on the market, and if it does not lower prices, will hold them where they are.

Pig Iron.

The close of the year finds the price for all grades of Pig Iron at Pittsburgh, which may be taken for the ruling price, lower than at the commencement, though not as low as during the summer months. The year opened with Mill or Forge Red-short Pig Irons, smelted from all ore, at \$21 per ton, 4 mos.; inferior grades, smelted from the same ore, with a mixture of 25% to 33% of cinder, but still showing some Red-short tendencies, were held at \$19; Connellsville Coke Irons, smelted from Fayette county ores, with a small mixture of Lake Superior or Cornwall ores, \$17.50. These prices gradually declined until August, when they were, respectively, \$19, \$17.50 and \$16. From this date there was a stiffening of prices and a slight advance, the year closing with the three grades mentioned selling at \$19.50, \$18 and \$16.50. This is a decline of from \$1 to \$1.50 per ton, as compared with Jan. 1, 1878. The new year does not find the feeling so good as in November; it rarely ever is. The outlook for 1879, however, is better than it has been for some time at the beginning of a year. The demand for certain grades of iron is very large, and there is no prospect of any decrease. This is notably true of Pig Irons for Bessemer and open-hearth purposes. The stocks of these Irons are nil, and of other Iron very much reduced below what they were a year ago. Manufactured Iron will be in larger demand than ever before. The Old Rail problem is being solved; the demand for these for re-rolling, and for manufacturing into other forms, is so great that they have appreciated in price at least \$4 during the year. The prospect of the extension of our railroad system during 1879 is very good, and Iron Rails will be in better demand, as will Fish Plates, Truck Bolts and Nuts, and Railroad Spikes, all of which increased the demand for Old Rails, and, consequently, will leave fewer to come into competition with Pig Iron. Judging from the past five years, the large majority of the roads built will be west of the Alleghenies, which will tend to increase the trade of this section considerably. From all these facts, we judge that Pig Iron must advance during the year.

Price of Coke and Bituminous Irons at Pittsburgh.

We give below a continuation of our table, showing the range of prices at Pittsburgh for Gray Forge Bituminous Irons for each month from 1869 to 1878, inclusive. The quotations are all on a basis of four months' time, and do not include either fancy brands or the very inferior grades, but the ordinary run of Forge Irons:

Range of Prices at Pittsburgh of Gray Forge Coke or Bituminous Pig Iron, Smelted in whole or in part from Lake Superior Ores, for each Month from January, 1869, to December, 1878, Compiled from Actual Sales.

| Month | 1869 | 1870 | 1871 | 1872 | 1873 | 1874 | 1875 | 1876 | 1877 | 1878 |
|-----------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| January | \$17.50 @ \$18.00 | \$18.00 @ \$18.50 | \$18.50 @ \$19.00 | \$19.00 @ \$19.50 | \$19.50 @ \$20.00 | \$20.00 @ \$20.50 | \$20.50 @ \$21.00 | \$21.00 @ \$21.50 | \$21.50 @ \$22.00 | \$22.00 @ \$22.50 |
| February | \$17.50 @ \$18.00 | \$18.00 @ \$18.50 | \$18.50 @ \$19.00 | \$19.00 @ \$19.50 | \$19.50 @ \$20.00 | \$20.00 @ \$20.50 | \$20.50 @ \$21.00 | \$21.00 @ \$21.50 | \$21.50 @ \$22.00 | \$22.00 @ \$22.50 |
| March | \$17.50 @ \$18.00 | \$18.00 @ \$18.50 | \$18.50 @ \$19.00 | \$19.00 @ \$19.50 | \$19.50 @ \$20.00 | \$20.00 @ \$20.50 | \$20.50 @ \$21.00 | \$21.00 @ \$21.50 | \$21.50 @ \$22.00 | \$22.00 @ \$22.50 |
| April | \$17.50 @ \$18.00 | \$18.00 @ \$18.50 | \$18.50 @ \$19.00 | \$19.00 @ \$19.50 | \$19.50 @ \$20.00 | \$20.00 @ \$20.50 | \$20.50 @ \$21.00 | \$21.00 @ \$21.50 | \$21.50 @ \$22.00 | \$22.00 @ \$22.50 |
| May | \$17.50 @ \$18.00 | \$18.00 @ \$18.50 | \$18.50 @ \$19.00 | \$19.00 @ \$19.50 | \$19.50 @ \$20.00 | \$20.00 @ \$20.50 | \$20.50 @ \$21.00 | \$21.00 @ \$21.50 | \$21.50 @ \$22.00 | \$22.00 @ \$22.50 |
| June | \$17.50 @ \$18.00 | \$18.00 @ \$18.50 | \$18.50 @ \$19.00 | \$19.00 @ \$19.50 | \$19.50 @ \$20.00 | \$20.00 @ \$20.50 | \$20.50 @ \$21.00 | \$21.00 @ \$21.50 | \$21.50 @ \$22.00 | \$22.00 @ \$22.50 |
| July | \$17.50 @ \$18.00 | \$18.00 @ \$18.50 | \$18.50 @ \$19.00 | \$19.00 @ \$19.50 | \$19.50 @ \$20.00 | \$20.00 @ \$20.50 | \$20.50 @ \$21.00 | \$21.00 @ \$21.50 | \$21.50 @ \$22.00 | \$22.00 @ \$22.50 |
| August | \$17.50 @ \$18.00 | \$18.00 @ \$18.50 | \$18.50 @ \$19.00 | \$19.00 @ \$19.50 | \$19.50 @ \$20.00 | \$20.00 @ \$20.50 | \$20.50 @ \$21.00 | \$21.00 @ \$21.50 | \$21.50 @ \$22.00 | \$22.00 @ \$22.50 |
| September | \$17.50 @ \$18.00 | \$18.00 @ \$18.50 | \$18.50 @ \$19.00 | \$19.00 @ \$19.50 | \$19.50 @ \$20.00 | \$20.00 @ \$20.50 | \$20.50 @ \$21.00 | \$21.00 @ \$21.50 | \$21.50 @ \$22.00 | \$22.00 @ \$22.50 |
| October | \$17.50 @ \$18.00 | \$18.00 @ \$18.50 | \$18.50 @ \$19.00 | \$19.00 @ \$19.50 | \$19.50 @ \$20.00 | \$20.00 @ \$20.50 | \$20.50 @ \$21.00 | \$21.00 @ \$21.50 | \$21.50 @ \$22.00 | \$22.00 @ \$22.50 |
| November | \$17.50 @ \$18.00 | \$18.00 @ \$18.50 | \$18.50 @ \$19.00 | \$19.00 @ \$19.50 | \$19.50 @ \$20.00 | \$20.00 @ \$20.50 | \$20.50 @ \$21.00 | \$21.00 @ \$21.50 | \$21.50 @ \$22.00 | \$22.00 @ \$22.50 |
| December | \$17.50 @ \$18.00 | \$18.00 @ \$18.50 | \$18.50 @ \$19.00 | \$19.00 @ \$19.50 | \$19.50 @ \$20.00 | \$20.00 @ \$20.50 | \$20.50 @ \$21.00 | \$21.00 @ \$21.50 | \$21.50 @ \$22.00 | \$22.00 @ \$22.50 |

Stocks of Coke or Bituminous Irons.

It is too early to arrive at any definite figures as to stocks in the West. It is a fact, however, that in many cases stocks of Pig Iron that were left at furnaces when they blew out have been cleaned up, and stocks of iron at active furnaces, which were made some years ago, are being closed out. It is also true that stocks held on speculation or by furnace men in hopes of a rise, have been closed out. To show the reduction in stocks the past four years, we give the following tables of stocks on hand at furnaces, unsold on the 1st day of December, 1874-77. It is needless to say that the figures are from the careful and accurate reports of Mr. James M. Swank, secretary of the American Iron and Steel Association:

STOCKS OF PIG IRON UNSOLD DEC. 31, 1874, 1875, 1876, 1877, NET TONS.

| Locality | 1874 | 1875 | 1876 | 1877 |
|----------------------|---------|--------|--------|--------|
| Western Pennsylv. | 115,471 | 61,340 | 61,476 | 64,418 |
| Ohio | 49,170 | 63,062 | 82,012 | 70,455 |
| Kentucky | 8,080 | 12,295 | 10,614 | 5,700 |
| Tennessee | 2,781 | 2,000 | 991 | 4,809 |
| Michigan and Indiana | 8,795 | 7,181 | 1,000 | 2,744 |
| Illinois | 7,229 | 5,816 | 4,746 | 7,792 |
| Wisconsin | 1,639 | 1,000 | ... | ... |
| Missouri | 11,300 | 8,362 | 5,978 | 900 |

Total... 203,036 161,595 167,817 156,818

This is but a little over 10 per cent. of the annual make, and can hardly be regarded as more than an average stock between the producer and consumer.

Condition of the Coke and Bituminous Furnaces.

We have received but partial returns of the furnaces in and out of blast on the first of the year, which we collate below:

Partial List of Coke and Bituminous Furnaces in and out of Blast Jan. 1, 1875, 1877, 1878 and 1879.

| Locality | In Blast | Out of Blast |
|-------------------------|------------------------|--------------|
| Shenango Val. | 12 11 12 8 20 20 10 22 | |
| Pittsburgh and vicinity | 6 6 7 8 5 5 6 4 | |
| Allegheny Val. | 4 4 4 4 4 4 4 4 | </ |

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| Alarm Money Drawers. | |
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| Richardson Mfg. Co., Worcester, Mass. | 29 |
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| Clark Wm., Westville, Conn. | 29 |
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| Coopers' Tools, etc., Manufacturers of. | |
| D. R. Barton Tool Co., Rochester, N. Y. | 7 |
| Copper. | |
| The New Haven Copper Co., 255 Pearl, N. Y. | 2 |
| Corn Huskers. | |
| Chambers, Bering & Quinlan, Decatur, Ill. | 28 |
| Corn Shellers. | |
| Rumsey & Co., Seneca Falls, N. Y. | 7 |
| The Gould Mfg. Co., Seneca Falls, N. Y. | 7 |
| Corrugated Iron. | |
| Moseley Iron Bridge and Roof Co., 5 Dey, N. Y. | 35 |
| Crucibles, Manufacturers of. | |
| Wile, Siedel & Co., 709 Market, Phila. | 33 |
| Cupolas & Blowers. | |
| Smith & Sayre Mfg. Co., 21 Cortlandt st., N. Y. | 26 |
| Curry Combs, Manufacturers of. | |
| Lawrence Curry Comb Co., 382 2d av., N. Y. | 26 |
| Cutlery, Importers of. | |
| Baker Hermann & Co., 103 Duane, N. Y. | 31 |
| Clayworthy F. W. & Co., Chambers, N. Y. | 31 |
| Fisher Jos. S., 411 Commerce, Phila. | 31 |
| Friedmann & Lauterjung, 14 Warren, N. Y. | 31 |
| Cutlery, Manufacturers of. | |
| Burkshaw Aaron, Poughkeepsie, Mass. | 13 |
| Goodell Company, Antrim, N. H. | 13 |
| John Russell Cutlery Co., 92 Chambers, N. Y. | 38 |
| Mary Bros., 120 Broadway, N. Y. | 38 |
| Meriden Cutlery Co., 49 Chambers, N. Y. | 10 |
| Naugatuck Cutlery Co., 82 Chambers, N. Y. | 10 |
| Syracuse Cutlery Co., Syracuse, N. Y. | 10 |
| The Pray Cutlery Co., Bridgeport, Conn. | 10 |
| The Lamson & Goodnow Mfg. Co., 88 Chambers, N. Y. | 10 |
| Differential Pulley Blocks. | |
| Yale Lock Mfg. Co., 43 Chambers, N. Y. | 4 |
| Dinner Pail & Lanterns. | |
| Haigh, Jos., Rochester, N. Y. | 2 |
| Discount Tables. | |
| Jennings S. H., Deep River, Conn. | 16 |
| Door and Gate Springs. | |
| Dunne P. B., 115 John, N. Y. | 28 |
| Van Wagoner & Williams, 82 Beekman, N. Y. | 28 |
| Drilling Machines, Makers of. | |
| Thorne, De Haven & Co., Philadelphia. | 9 |
| Wiley & Russell, Greenfield, Mass. | 9 |
| Drop Forgings. | |
| Rose Wm. & Bros., West Philadelphia, Pa. | 6 |
| Merrill C. & Sons, 555 Grand, N. Y. | 6 |
| Drop Hammers. | |
| The Stiles & Parker Press Co., Middletown, Ct. | 37 |
| Drop Presses. | |
| Recher & Peck, New Haven, Conn. | 36 |
| Edge Tools, Makers of. | |
| Doehner M., 56 Chambers, N. Y. | 27 |
| M. Gregg & Son, Rochester, N. Y. | 27 |
| The D. L. Barton Tool Co., Rochester, N. Y. | 7 |
| Elbows (Steam Pipe). | |
| Hogan Elbow Co., Cleveland, Ohio. | 23 |
| Elevators, Makers of. | |
| Crane Bros. Mfg. Co., Chicago, Ill. | 2 |
| Stokes & Parrish, Philadelphia, Pa. | 2 |
| Elevator Buckets. | |
| Rowland T. F., Brooklyn, N. Y. | 32 |
| Emery Wheels. | |
| Lehigh Valley Emery Wheel Co., Weisport, Pa. | 38 |
| Engraving, Machinery, etc. | |
| Northern States Coal, Iron & Land Co., South Pittsburg, Tenn. | 6 |

| Phoenix Iron Co., 410 Walnut, Philadelphia. | 5 |
|--|----|
| Rome Merchant Iron Mills, Rome, N. Y. | 4 |
| Rowland Wm. & Harvey, Philadelphia. | 38 |
| Shoenberger & Co., Pittsburg, Pa. | 4 |
| Taylor & Boggs, Cleveland, O. | 4 |
| The Pacific Rolling Mill Co., Paterson, N. J. | 4 |
| Vulcan Iron and Nail Works, Chattanooga, Tenn. | 6 |
| S. C. Iron and Tin Plate Co., Pittsburg, Pa. | 6 |
| Wilson Car and Foundry Co., Chattanooga, Tenn. | 6 |
| Wood Alan & Co., 519 Arch Philadelphia. | 5 |
| Zug & Co., Pittsburg, Pa. | 4 |
| Iron, Planished Sheet, Manufacturers of. | |
| Wood W. D. Co., Pittsburg, Pa. | 4 |
| Lanterns, Manufacturers of. | |
| Diets R. E. (Tubular) 44 and 46 Fulton, N. Y. | 38 |
| DuBois N. Co., Cincinnati, O. | 38 |
| Howard & Morse, 41 Fulton, N. Y. | 38 |
| Lathes. | |
| North Selden G., Philadelphia. | 36 |
| Lawn Mowers. | |
| Ohio Mfg. Co., Cleveland, O. | 36 |
| Levels. | |
| Henry & Sons, Philadelphia. | 25 |
| Locks, Manufacturers of. | |
| Bohannon Wilson, Broadway and Kosuth, Brook. | 34 |
| Conestoga Lock Co., Center, N. Y. | 34 |
| D. K. Miller Lock Co., Philadelphia, Pa. | 37 |
| Hoyt Fred J., 73 Broadway, N. Y. | 37 |
| Romer & Co., Newark, N. J. | 37 |
| Smith & Egge Mfg. Co., Bridgeport, Conn. | 8 |
| Yale Lock Mfg. Co., 41 Chambers, N. Y. | 24 |
| Machinery, Makers of. | |
| Bliss & Williams, 157 Plymouth, Brooklyn. | 37 |
| Flanders L. B., 1045 Hamilton, Phila. | 39 |
| Johnson & Co., 121 Center, N. Y. | 39 |
| Mohawk & Hudson Mfg. Co., Waterford, N. Y. | 34 |
| Niles Tool Works, Hamilton, O. | 37 |
| Pittsburg Mfg. Co., Pittsburg, Pa. | 37 |
| Prairie & Whitney Co., Hartford, Conn. | 13 |
| Reynolds & Co., 124 and 126 Duane, N. Y. | 37 |
| The Bullard Machine Co., 14 Dev. N. Y. | 37 |
| The Stiles & Parker Press Co., Middletown, Ct. | 37 |
| Machinery (Barne's Foot Power). | |
| Little Chas. E., 49 Fulton, N. Y. | 36 |
| Machine Screws, Makers of. | |
| Leon & Feltus & Co., 20 and 21 Cliff, N. Y. | 38 |
| Machinists' Tools, Makers of. | |
| Blaisdell F. Co., Worcester, Mass. | 36 |
| Malleable Iron Castings, Makers of. | |
| Hammer & Co., Branford, Conn. | 37 |
| Wheeler & Co., Mt. Carmel, Conn. | 37 |
| Mallets. | |
| N. Y. Handle and Mallet Works, 456 E. Houston. | 10 |
| Mechanics' Tools. | |
| Jennings C. E. & Co., 98 Chambers, N. Y. | 38 |
| Metric Chopping Machinery. | |
| Murray Iron Works, Burlington, Iowa. | 3 |
| Metal Dealers and Brokers. | |
| Whitehead Bros., 517 W. 15th, N. Y. | 4 |
| Metal Plates. | |
| Graves O. W., Cor. Cliff and Beekman, N. Y. | 4 |
| Phelps, Dodge & Co., Cliff bet. John and Fulton, N. Y. | 2 |
| Phelps, Dodge & Co., 20 and 21 Cliff, N. Y. | 2 |
| Read, D. W. R. & Co., 204 Walnut, Phila. | 4 |
| Quincy J. W., 98 William, N. Y. | 6 |
| Starr John, Halifax, Nova Scotia. | 12 |
| Metallic Shingles. | |
| Ironclad Manufacturing Co., Brooklyn, N. Y. | 31 |
| Metalurgists. | |
| Edget Geo. M., 339 Walnut, Philadelphia. | 5 |
| Mica. | |
| Chester Mica & Porcelain Co., 87 Liberty, N. Y. | 27 |
| Mill Gearing. | |
| Bole & Hunt, Baltimore. | 3 |
| Mineral Dealers, Makers of. | |
| James Boyd's Sons, 10 and 12 Franklin, N. Y. | 30 |
| Mineral Lamps, Dealer in. | |
| Hoskins W. A., Chattanooga, Tenn. | 6 |
| Mineral Wool. | |
| Ebers Alexander D., 264 Broadway, N. Y. | 10 |
| Models. | |
| Burrows Wm., 99 Fulton, N. Y. | 10 |
| Molding Sand. | |
| Whitehead Bros., 517 W. 15th, N. Y. | 4 |
| Mouse Traps. | |
| Diets R. E., 44 and 46 Fulton, N. Y. | 38 |
| Oliver E., 106 and 108 Beekman, N. Y. | 3 |
| Riley Mfg. Co., Unionville, Conn. | 8 |
| Nails. | |
| Schoenberger & Co., Pittsburg, Pa. | 4 |
| Zug & Co., Pittsburg, Pa. | 4 |
| Nail Machinery. | |
| Corley & Co., Pittsburg, Pa. | 4 |
| Pittsburg Mfg. Co., Pittsburg, Pa. | 37 |
| Nail Puller. | |
| Smith M. E., Kirksville, Mo. | 35 |
| Nickel Platers. | |
| Hartman John, 374 N. Seventh, Philadelphia. | 35 |
| Nickel Platers' Supplies. | |
| Condit, Hanson & Van Winkle, Newark, N. J. | 35 |
| Rowland Wm. & Harvey, Frankford, Phila. | 38 |
| Zucker & Levett, 639 and 641 W. 15th, N. Y. | 22 |
| Norway Shapes, Rollers of. | |
| Rowland Wm. & Harvey, Frankford, Philadelphia. | 38 |
| Note Broker. | |
| Gallaudet F. W., 3 and 5 Wall, N. Y. | 4 |
| Nut Tapping Machines. | |
| Howard Iron Works, Buffalo, N. Y. | 36 |
| Nuts, Bolts, etc., Makers of. | |
| Haskell V. H. & Co., Pawtucket, R. I. | 31 |
| Lewis, Oliver & Phillips, Pittsburg, Pa. | 6 |
| Russell, Birdsell & Ward, Port Chester, N. Y. | 38 |
| Sinton Co., Birmingham, Conn. | 31 |
| Standard Nut Co., Pittsburg, Pa. | 31 |
| Sternbergh J. H., Reading, Pa. | 31 |
| Oil Stones. | |
| Boyd & Chase, 107th and Harlem River, N. Y. | 31 |
| Oil Tanks. | |
| Kellogg & Johnson, Elmira, N. Y. | 29 |
| Packing (Steam). | |
| Symonds & Co., Philadelphia. | 27 |
| Patent Solicitors. | |
| Hawson & Son, Phila. and Washington, D. C. | 6 |
| Stanton Thomas D., 23 Murray, N. Y. | 7 |
| Weldersheim John & Co., 118 South 4th, Phila. | 6 |
| Phosphor Bronze. | |
| Phosphor Bronze Smelting Co., 208 Washington | 9 |
| Phila., Pa. | 9 |
| Picks, Makers of. | |
| Pierion & Co., 24 Broadway, N. Y. | 4 |
| Pipes, Fittings, etc., Makers of. | |
| Eaton, Cole & Burroughs Co., 48 John, N. Y. | 29 |
| McNair & Harlin Mfg. Co., 48 John, N. Y. | 29 |
| Pancost & Maule, 227 Pearl, Philadelphia. | 29 |
| Pipe Tongs. | |
| Lansfield Elastic Frog Co., New Haven, Conn. | 24 |
| Pipe Water. | |
| McNeals & Archer, Burlington, N. J. | 6 |
| Wood R. D. & Co., 400 Chestnut, Philadelphia. | 29 |
| Plane Irons, Manufacturers of. | |
| D. R. Barton Tool Co., Rochester, N. Y. | 7 |
| Planes, Manufacturers of. | |
| Reilly Wringing Machine Co., 92 Chambers, N. Y. | 21 |
| D. R. Barton Tool Co., Rochester, N. Y. | 21 |
| Stanley Rule and Level Co., 29 Chambers, N. Y. | 10 |
| Plated Ware. | |
| Gall, Eben Co., 75 Chambers, N. Y. | 10 |
| Plumbers' Materials, Manufacturers of. | |
| Everhart Jas. M., Scarsdale, Pa. | 38 |
| Carr Wm. S. & Co., 105 Center, N. Y. | 29 |
| Pocket Knives. | |
| Baker Hermann & Co., 103 Duane, N. Y. | 10 |
| Presses, Fruit and Vegetable. | |
| Mohawk & Hudson Mfg. Co., Waterford, N. Y. | 34 |
| Presses, Paper, Makers of. | |
| Bliss & Williams, 157 Plymouth, Brooklyn. | 37 |
| Merriman A. H., West Meriden, Conn. | 37 |
| The Stiles & Parker Press Co., Middletown, Ct. | 37 |
| Pumps, Friction. | |
| Penfield Block Works, Lockport, N. Y. | 35 |
| Providence Tool Co., Providence, R. I. | 34 |
| Pumps, Makers of. | |
| Field Pump & Siphon Co., New London, Conn. | 31 |
| Davis J. B., 97 Liberty, N. Y. | 38 |
| Douglas W. B., Middletown, Conn. | 7 |
| Gunnels & Co., Seneca Falls, N. Y. | 12 |
| Rumsey L. M. & Co., St. Louis, Mo. | 7 |
| Union Mfg. Co., 28 Chambers, N. Y. | 7 |
| Rails, Iron or Steel, Makers of. | |
| Cambria Iron Co., Johnstown, Pa. | 8 |
| The Edgar Thomson Steel Co., 47 Broadway, N. Y. | 6 |
| Ratways, Car and Locomotive Fittings. | |
| Wilson, Walker & Co., Pittsburg, Pa. | 3 |
| Ratchets. | |
| Pancost & Maule, Philadelphia, Pa. | 12 |
| Reamers. | |
| Gilmer Wm., of Wm. Baltimore, Md. | 38 |
| Grundy, Geo. C., 164 Greenwich, N. Y. | 29 |
| Harmon & Sons, Kingston, Mass. | 38 |
| Townsend W. P. & Co., Pittsburg, Pa. | 12 |
| Rolls (Chilled). | |
| Garrison A. & Co., Pittsburg, Pa. | 6 |
| Rules, Manufacturers of. | |
| Stanley Rule and Level Co., 29 Chambers, N. Y. | 10 |
| Stephens & Co., Riverton, Conn. | 21 |
| Sand and Emery Paper, Makers of. | |
| Baeder, Adamson & Co., 730 Market, Philadelphia. | 3 |
| Sash Tighteners. | |
| Rowland T. F., Brooklyn, N. Y. | 32 |
| Saws, Makers of. | |
| American Saw Co., Trenton, N. J. | 31 |
| Diston Henry & Sons, Phila. | 31 |
| Peace Harvey W., Williamsburg, N. Y. | 31 |
| Wheeler, Madden & Clemens Mfg. Co., Middle. | 31 |
| South, N. Y. | 31 |
| Saws, Manufacturers of. | |
| Howe Scale Co., Rutland, Vt. | 7 |
| Chastillon John & Sons, 31 Cliff, N. Y. | 7 |
| Heile Bros., 4th above Market, Phila. | 7 |

| Screws, Makers of. | 3 |
|---|----|
| American Screw Co., Providence, R. I. | 3 |
| Miles F. S., 205 Quarry, Phila. | 10 |
| Philadelphia Screw Co., Philadelphia, Pa. | 10 |
| Screw Cutting Machinery. | |
| Howard Iron Works, Buffalo, N. Y. | 36 |
| Wiley & Russell Mfg. Co., Greenfield, Mass. | 36 |
| Screw Drivers, (Improved) Makers of. | |
| Diston Henry & Sons, Phila. | 35 |
| Scroll Saws. | |
| Lewis Mfg. Co., Seneca Falls, N. Y. | 5 |
| Screws. | |
| Beardley Seythe Co., West Winsted, Conn. | 7 |
| Seythe & Co., East Haverhill, N. H. | 12 |
| Shovels, etc. | |
| Rowland B. & Co., Philadelphia. | 11 |
| Shots, etc. | |
| Sparks Thos. W., 121 Walnut, Philadelphia. | 35 |

tonnage in comparison with the other totals. The following are the receipts of Raw Iron for each month during the past year, with a comparison of totals for five years previous:

| | Metal, tons. | Ore, tons. | Scrap, tons. | Blooms, tons. |
|----------------|--------------|------------|--------------|---------------|
| January..... | 20,416 | 15,840 | 1,785 | 70 |
| February..... | 18,154 | 12,100 | 2,655 | 1,208 |
| March..... | 23,101 | 19,530 | 2,935 | 800 |
| April..... | 18,164 | 19,320 | 4,840 | 470 |
| May..... | 15,386 | 17,520 | 2,157 | 870 |
| June..... | 13,028 | 16,760 | 2,516 | 810 |
| July..... | 16,455 | 15,400 | 1,820 | 950 |
| August..... | 14,530 | 25,790 | 1,230 | 530 |
| September..... | 11,745 | 18,720 | 2,410 | 990 |
| October..... | 17,770 | 21,850 | 5,880 | 1,220 |
| November..... | 14,676 | 25,150 | 2,940 | 760 |
| December..... | 15,735 | 23,350 | 2,320 | 1,340 |

| | | | | |
|------------|---------|---------|---------|--------|
| Total..... | 198,680 | 231,730 | 33,471 | 10,148 |
| 1877..... | 190,885 | 230,913 | 30,913 | 6,318 |
| 1876..... | 177,833 | 213,559 | 35,066 | 10,645 |
| 1875..... | 173,849 | 215,599 | 53,286 | 7,080 |
| 1874..... | 217,611 | 255,217 | 90,990 | 1,000 |
| 1873..... | 208,133 | 300,849 | 112,209 | 1,000 |

An analyses of these figures, in relation to the sources of supply, show quite a change in the tonnage from different sections. To show this change, we append a table giving the receipts of metals by each railroad centering in Pittsburgh, and by river, for the past three years:

| | 1876, Tons. | 1877, Tons. | 1878, Tons. |
|-----------------------------|-------------|-------------|-------------|
| Pitts. Ft. Wayne and C..... | 115,374 | 95,370 | 63,370 |
| Cleveland and P..... | 27,319 | 36,622 | 48,840 |
| Pennsylvania..... | 12,302 | 13,080 | 13,080 |
| Baltimore and Ohio..... | 16,322 | 16,745 | 16,745 |
| All. Val..... | 14,085 | 4,898 | 4,898 |
| P. Clin. and St. L..... | 14,085 | 13 | 1,190 |
| River..... | 30,078 | 15,869 | 35,113 |
| Total..... | 214,588 | 190,885 | 198,680 |

The noticeable feature of this table is the falling off in the receipts over the Pittsburgh, Fort Wayne and Chicago Railroad, or of metal from the Shenango and Mahoning valleys, amounting to 52,000 tons less in 1878 than in 1876, and the increase in receipts over the Pennsylvania Railroad. These have increased 22,000 tons.

STOCKS OF PIG IRON AT PITTSBURGH.

The stocks of Pig Iron in the brokers' yards in Pittsburgh, on the 1st day of January, for the past four years, are as follows:

| Kind of Iron. | 1876, Jan. 1. | 1877, Jan. 1. | 1878, Jan. 1. |
|------------------|---------------|---------------|---------------|
| Coke, Forge..... | 25,500 | 15,000 | 15,880 |
| Foundry..... | 2,500 | 700 | 900 |
| Charcoal..... | 14,000 | 6,650 | 7,320 |
| Total..... | 42,000 | 22,400 | 24,100 |

The increase, it will be seen, is considerable, but if the stocks at the mills are reckoned, the total stock in the city will not be increased. COAL AND COKE SHIPMENTS FROM PITTSBURGH BY RIVER.

The statistics of the shipments of Coal and Coke down the Ohio River show a large business for the year just closed. The total falls about 1,000,000 bushels below the unprecedented shipments of 1877, but, with that exception, are the largest year's shipments on record, being 3,600,000 bushels larger than those for 1875, which were the largest previous to 1877. From the figures below, it will be seen that the average shipments of Coal and Coke down the river from Pittsburgh, for the past ten years, have been 54,632,000 bushels, or a little more than 2,000,000 tons. The shipments for the past year are 11,000,000 bushels above the average.

From the figures below, it appears that nearly two-thirds of the shipments were made in the first half of the year, the total for the first six months being 42,110,000 bushels. This movement is only exceeded by the corresponding period of 1877, in which the shipments were 43,939,500 bushels, and the next largest shipments during a similar period are those for the last half of 1875, in which they aggregated 40,897,000 bushels. The shipments for the last half of the past year were light, being only a trifle over 23,000,000 bushels.

| | |
|------------------|------------|
| Total, 1878..... | 65,697,000 |
| " 1877..... | 66,936,500 |
| " 1876..... | 55,678,000 |
| " 1875..... | 64,025,000 |
| " 1874..... | 59,025,000 |
| " 1873..... | 58,518,500 |
| " 1872..... | 53,333,000 |
| " 1871..... | 44,404,000 |
| " 1870..... | 41,175,000 |
| " 1869..... | 43,530,000 |

The distribution of these shipments is given in the table below, showing the points to which the Coal was shipped. These figures, it must be remembered, do not give the ultimate destination of the Coal, but only the points to which the original tows were made up. A large share of the Coal shipped to Cincinnati and Louisville, was re-shipped from those cities to other down-river points. The statement is as follows:

| | Bushels. |
|------------------|------------|
| Cincinnati..... | 25,176,000 |
| Louisville..... | 38,068,000 |
| Wheeling..... | 675,000 |
| Bellair..... | 19,000 |
| St. Louis..... | 1,003,000 |
| Ashland..... | 99,000 |
| New Albany..... | 87,000 |
| Ironton..... | 20,000 |
| Natchez..... | 20,000 |
| Madison..... | 192,000 |
| New Orleans..... | 860,000 |
| Total..... | 65,697,000 |

The bushel is 36 lbs.

Hanging Rock Charcoal Irons.

The make of Pig Iron in this district has declined rapidly in the past four or five years. In 1873 it was 92,365 net tons; in 1874, 85,873 tons; in 1875, 57,413 tons, and in 1877, 40,212 tons. Many of the furnaces of this region have been abandoned for reasons connected with their location and the cost of making Pig Iron, and some are being changed to Coke furnaces.

Most of the Iron produced in this region is marketed in Cincinnati. We are indebted to Mr. Sidney D. Maxwell, superintendent of the Cincinnati Chamber of Commerce, for advance sheets of his report on this industry. From this report we learn that the past year in the Pig Iron business of Cincinnati and the districts tributary to it, in its leading features, have not been unlike the preceding years, save that, at the close, there was a more general conviction that prices had reached their lowest point, and that the Iron business, participating in the general improvement, had a better future near at hand. Certainly, there is reason to hope the latter may be fully verified, for, at this time,

taking a retrospect of the past five years, it presents a spectacle of depreciation, depression and loss which has had few parallels in the history of business in this country. The whole period has been one of a steady movement to lower values, which nothing was equal to resisting. Whatever lulls occurred in this journey to lower prices were but merciful spells, to enable producers and dealers to gather up their energies for still further shrinkage and trials. The past year, though not exhibiting the shrinkage of some preceding years, has been no exception in depreciation. To it appears to have been committed the occasion for wringing out from values all that remained to be removed. At the commencement of the year 1877-78, No. 1 Hot Blast Charcoal Iron was quotable, at Cincinnati, at \$23 @ \$24 per ton. Prices were nominally unchanged until February, when a decline of \$1 per ton was established; and again, in August, when an additional \$1 was taken from its value, the year closing with this grade of Iron quotable at \$21 @ \$22, \$2 below the price at the opening of the year, and \$37 below the highest prices of 1872-73, when the quotation was \$58 @ \$59. The average quotation for this grade of Iron, at Cincinnati, in the past year, was \$22.84, compared with \$24.14 in 1876-77, \$25.16 in 1875-76, \$29.28 in 1874-75, \$39.21 in 1873-74, \$55.33 in 1872-73, and \$46.74 in 1871-72.

Amid the changes which have been taking place in the Iron business of the country, it is a matter for the congratulation of our people, that the position of this city is steadily growing in importance as an Iron center. Cincinnati receives Iron from eight to ten States, and ships to as many. During the past year the scope of her distribution has been wider than ever before. The districts immediately tributary to the city can manufacture Iron as cheaply as any locality in the United States. The encroachments made on the production of Charcoal Iron by Stonecoal Metal, has been nowhere more apparent than in this vicinity, and the ability of our furnaces, in many instances, to manufacture Iron at prices which have taken a large number of furnaces, less fortunately located, out of blast, shows how strongly entrenched are our interests in this great department of industry. With the revival of the Iron business, it may be safely asserted that this section, embracing interests rich enough for the foundations of an empire, will be able to enter at once on the enjoyment of the improved condition, fully prepared to take a more influential position in Iron production than she has ever before enjoyed.

Table showing the quotations for the various kinds of Iron, in Cincinnati, at the close of August, for two years, the price being per ton, save where otherwise named:

| Hot-Blast Charcoal. | | | |
|-------------------------|-------------------|-------------------|--|
| Kinds. | 1877-78. | 1876-77. | |
| Hanging Rock No. 1..... | \$21.00 @ \$22.00 | \$23.00 @ \$24.00 | |
| Hanging Rock No. 2..... | 19.00 @ 20.00 | 22.00 @ 22.50 | |
| Hanging Rock Forge..... | 18.00 @ 19.00 | 20.00 @ 21.00 | |
| Tennessee No. 1..... | 19.00 @ 20.00 | 21.50 @ 22.00 | |
| Tennessee Forge..... | 17.00 @ 18.00 | 21.00 @ 22.00 | |
| Alabama No. 1..... | 19.00 @ 20.00 | 22.50 @ 23.00 | |
| Missouri No. 1..... | 19.00 @ 20.00 | 23.50 @ 24.50 | |
| Missouri No. 2..... | 18.00 @ 19.00 | 22.00 @ 23.00 | |

| Hot-Blast Stone Coal. | | | |
|-----------------------|-------------------|-------------------|--|
| Missouri No. 1..... | \$19.00 @ \$20.00 | \$22.00 @ \$23.00 | |
| Missouri Forge..... | 17.00 @ 18.00 | 21.00 @ 22.00 | |
| Ohio No. 1..... | 17.00 @ 18.00 | 21.00 @ 22.00 | |
| Ohio No. 2..... | 16.00 @ 17.00 | 19.00 @ 20.00 | |
| Ohio Forge..... | 15.00 @ 16.00 | 19.00 @ 20.00 | |

| Cold-Blast Charcoal. | | | |
|-----------------------------|---------------|---------------|--|
| Hanging Rock Car Wheel..... | 30.00 @ 33.00 | 35.00 @ 40.00 | |
| Missouri Car Wheel..... | 24.00 @ 27.00 | 30.00 @ 35.00 | |
| Red River Car Wheel..... | 24.00 @ 27.00 | 30.00 @ 35.00 | |
| Tennessee Car Wheel..... | 30.00 @ 31.00 | 30.00 @ 35.00 | |
| Alabama Car Wheel..... | 27.00 @ 32.00 | 30.00 @ 35.00 | |
| Machinery and Forge..... | 23.00 @ 25.00 | 25.00 @ 28.00 | |
| Blooms..... | 32.00 @ 37.00 | 40.00 @ 50.00 | |

| Wrought. | | | |
|----------------------------------|-----------------|---------------|--|
| Bar, Common, per 100 lbs..... | \$2.00 @ \$2.00 | \$2.00 @ 2.25 | |
| Bar, Charcoal, per 100 lbs..... | 3.20 @ 3.20 | 3.20 @ 3.45 | |
| Scrap, Cast, 100 lbs..... | .50 @ .60 | .50 @ .65 | |
| Scrap, wrought, per 100 lbs..... | .50 @ 1.00 | .75 @ 1.00 | |

Table showing the quotations per ton for Hot-blast Charcoal Iron No. 1, in Cincinnati, at the close of August, for 15 years:

| Years. | Per ton. | Years. | Per ton. |
|--------------|----------|--------------|----------|
| 1863-64..... | \$80.00 | 1871-72..... | \$57.00 |
| 1864-65..... | 50.00 | 1872-73..... | 47.00 |
| 1865-66..... | 53.00 | 1873-74..... | 33.00 |
| 1866-67..... | 50.00 | 1874-75..... | 27.00 |
| 1867-68..... | 39.00 | 1875-76..... | 24.00 |
| 1868-69..... | 48.00 | 1876-77..... | 23.00 |
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Ohio Iron Statistics.

The following interesting statistical information concerning the iron industry of Ohio, is condensed from the forthcoming report of Hon. W. J. Walls, State Commissioner of Labor Statistics:

The table is prepared to show the growth of the present blast-furnace industry of the State. The dates and figures are taken from public records and data prepared by old furnace men:

| Year. | Stacks erected during year. | Total stacks. | Inc. capacity during year. | Total capacity at end of year. |
|-----------|-----------------------------|---------------|----------------------------|--------------------------------|
| 1849..... | 1 | 1 | 4,500 | 4,500 |
| 1850..... | 3 | 4 | 12,000 | 16,500 |
| 1851..... | 7 | 11 | 27,000 | 43,500 |
| 1852..... | 9 | 20 | 8,500 | 52,000 |
| 1853..... | 10 | 30 | 4,000 | 56,000 |
| 1854..... | 11 | 41 | 4,500 | 60,500 |
| 1855..... | 12 | 53 | 4,000 | 64,500 |
| 1856..... | 13 | 66 | 11,000 | 75,500 |
| 1857..... | 14 | 80 | 22,500 | 98,000 |
| 1858..... | 15 | 95 | 4,000 | 102,000 |
| 1859..... | 16 | 111 | 4,000 | 106,000 |
| 1860..... | 17 | 128 | 8,000 | 114,000 |
| 1861..... | 18 | 146 | 17,000 | 131,000 |
| 1862..... | 19 | 165 | 61,500 | 192,500 |
| 1863..... | 20 | 185 | 12,000 | 204,500 |
| 1864..... | 21 | 206 | 6,000 | 210,500 |
| 1865..... | 22 | 228 | 30,000 | 240,500 |
| 1866..... | 23 | 251 | 30,000 | 270,500 |
| 1867..... | 24 | 275 | 10,000 | 280,500 |
| 1868..... | 25 | 300 | 35,000 | 315,500 |
| 1869..... | 26 | 326 | 45,000 | 360,500 |
| 1870..... | 27 | 353 | 13,000 | 373,500 |
| 1871..... | 28 | 381 | 80,000 | 453,500 |
| 1872..... | 29 | 410 | 34,500 | 488,000 |

| | | | | |
|-----------|----|-----|--------|---------|
| 1874..... | 4 | 90 | 43,000 | 724,800 |
| 1875..... | 5 | 95 | 43,500 | 767,800 |
| 1876..... | 3 | 98 | 38,000 | 705,800 |
| 1877..... | 11 | 109 | 95,000 | 894,800 |

Furnaces not included in the foregoing table were erected in the years 1826, 1827, 1836, 1842, 1846, 1853, 1855 and 1856, a total of nine, all in the Hanging Rock region, all of which have been dismantled.

According to the foregoing table, the producing capacity of the blast furnaces of the State is, in round numbers, 900,000 tons annually, while the production has barely equaled half the capacity during the past few years.

The number of present employees aggregates 5160 for the 53 furnaces in operation, and 4015 employees necessary to put in operation the other 56 furnaces that are now out of blast. The 5100 do not represent all the employees, as some of the furnaces purchase their coal and ore, and the producers thereof are not counted by the furnace proprietors in making their returns to the Bureau.

It is a somewhat curious fact that while the opposition to Chinamen in this country comes from the laboring classes, the opposition to Americans and Europeans in China is found among the men of rank and wealth. Mr. Jamieson, one of the English consuls in that country, says, in a recent report, that notwithstanding the liberal subscriptions made by foreigners in aid of the famine sufferers, the better classes would rather see the foreigners beyond the border than acknowledge the value of their assistance. The recipients of the aid have, however, shown much gratitude, and the missionaries have been brought into better favor among them by their efforts to allay the suffering. Changes of public opinion in China occur very slowly, and the comparatively few persons of the higher orders who have traveled in other lands, and thus obtained broader views, do not seem to have impressed their associates with their own convictions.

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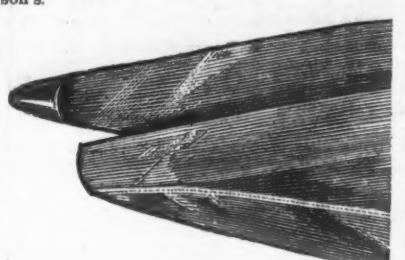
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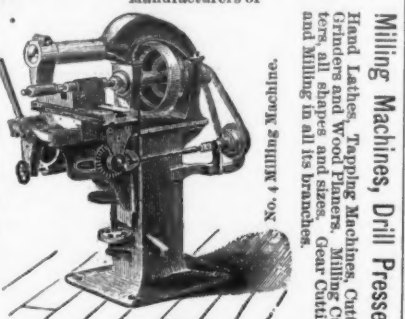
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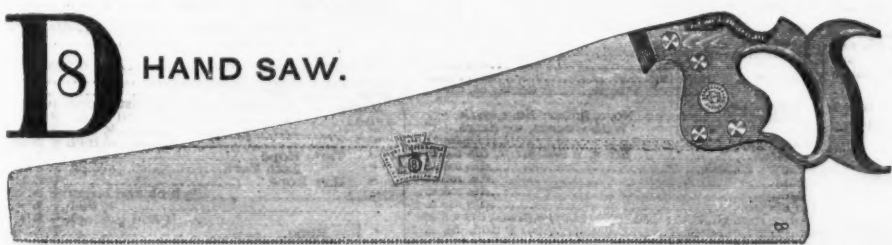
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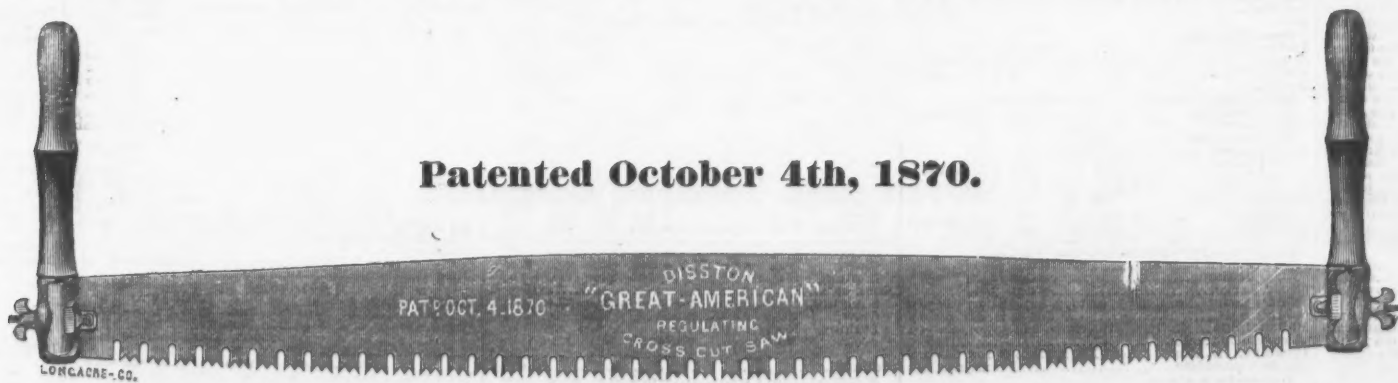
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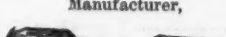
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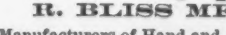


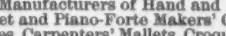


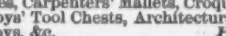














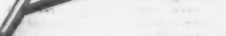




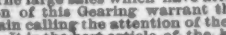


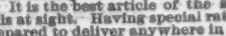


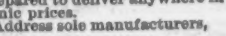




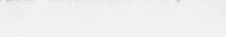


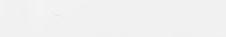


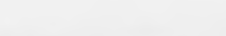




















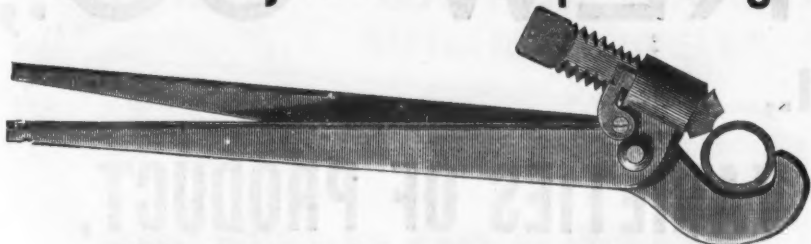








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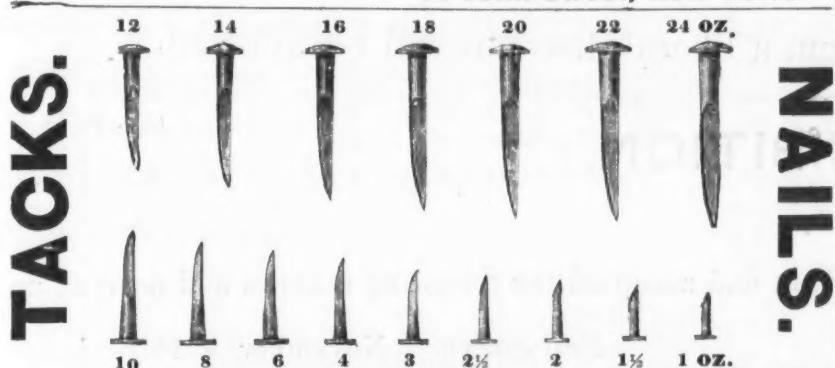
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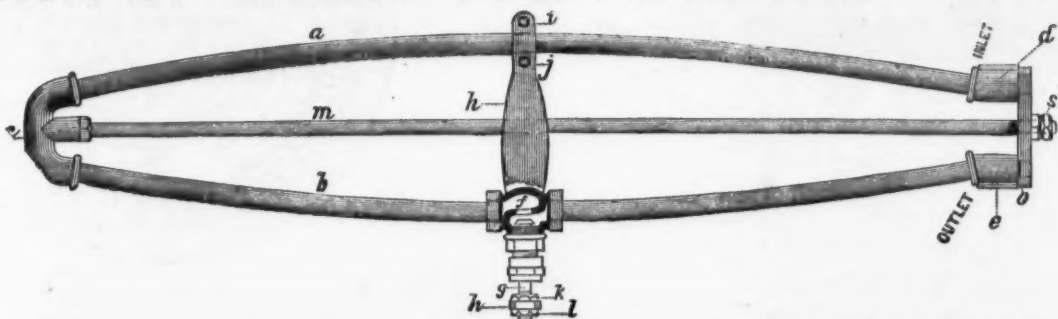
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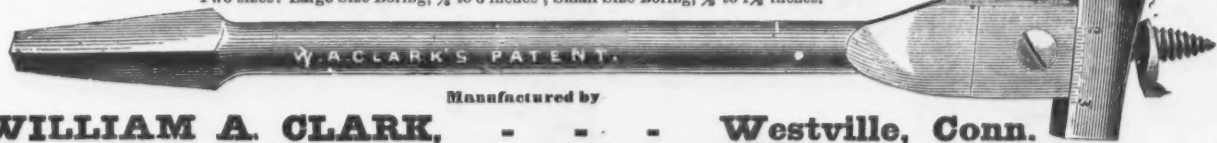
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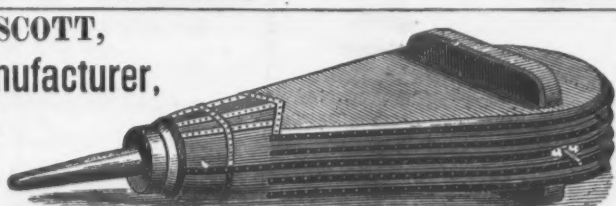
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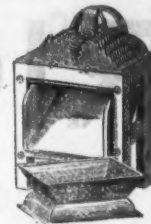
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viz: a rest and brace for the thumb, in such a position
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while using the comb. The wire braces which run from
the shank over the back to the front teeth give strength
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when clasped by the fingers in connection with the raised
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All goods are distributed through the Hardware trade, to whom a liberal discount will be allowed.

INTERNATIONAL EXHIBITION.

(No. 235.)

PHILADELPHIA, 1876.

The United States Centennial Commission has examined the report of the Judges, and accepted the following reasons, and decreed an award in conformity therewith.

PHILADELPHIA, November 8, 1876.

REPORT ON AWARDS.

Product: Iron, Brass and Steel Screws, Tire and Stove Bolts, Rivets.

Name and address of Exhibitor: American Screw Company, Providence, R. I.

The undersigned having examined the product herein described, respectfully recommends the same to the United States Centennial Commission for Award, for the following reasons, viz: Being of a quality nearly approaching perfection, showing the highest attainment in this branch of manufacture.

G. L. REED, Signature of the Judge.

Approval of Group Judges.

Daniel Steinmetz,
Jas. Bain,
Chas. Staples,

G. L. Reed,
J. D. Imboden,

J. Dittenbach,
Dav. McHardy.

A true copy of the record. Given by authority of the United States Centennial Commission.

[L.S.] J. L. CAMPBELL, Secretary.

FRANCIS A. WALKER, Chief of the Bureau of Awards.
A. T. GOSHORN, Director-General.
J. R. HAWLEY, President.



After forty years' experience we offer to the trade our Centennial Screws, patented May 30, 1876, as the best we have ever known.

The method of manufacturing is also patented, and we are changing our machinery as fast as possible, to manufacture the improved article only. To introduce them, they will be sold at the same price as the old style screw.

The new screws will be packed in manila colored boxes with the new label covering end of box, and enlarged figures showing plainly contents.

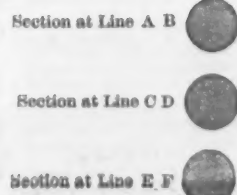
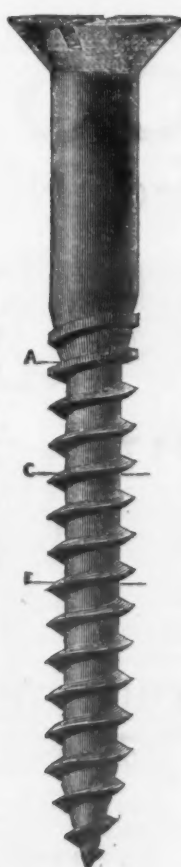
To distinguish this screw we have adopted a trade-mark, which is also secured to us.

The accompanying engravings show the progress of making screw from the old blunt point to style now adopted.

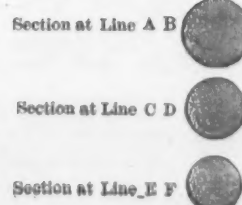
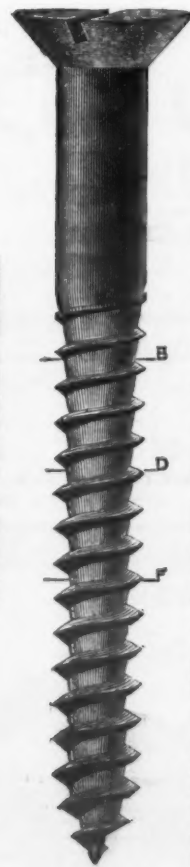
Experience has shown that the weak point of screws, as formerly made, is at the heel of the thread, where all



1846.
Patented August 30.



1876.
Patented May 30.
COVERED BY TRADE MARK.



Estimated to be FIFTY PER CENT. stronger than a Screw as Commonly made.

the strains of forcing the screw into the wood naturally concentrate.

To avoid the sharp angle existing in the old style of screws has been the aim of all manufacturers, but every expedient hitherto adopted has proved as objectionable as the evil complained of.

It will be seen in our new screw that not only is the sharp angle avoided, but the strength very much increased, as illustrated. See sections at lines.

CLAIM.

"A Pointed Wood Screw having the outer periphery of the thread upon its body cylindrical, while a portion of the body below the thread and near the neck is conical, the remainder of the body to the point being cylindrical, and yet having all the thread brought to an edge of a constant angle, without jogs in the paths between the threads, substantially as described."

Steel.

JOHN WILSON'S CELEBRATED BUTCHERS' KNIVES, BUTCHERS' STEELS, AND SHOE KNIVES.



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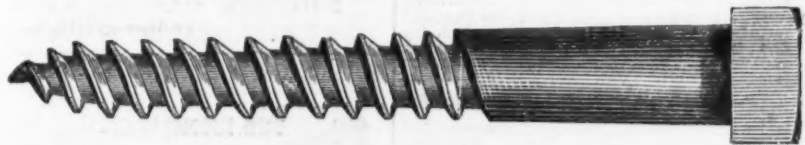
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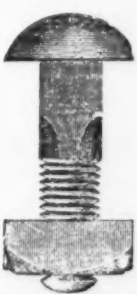
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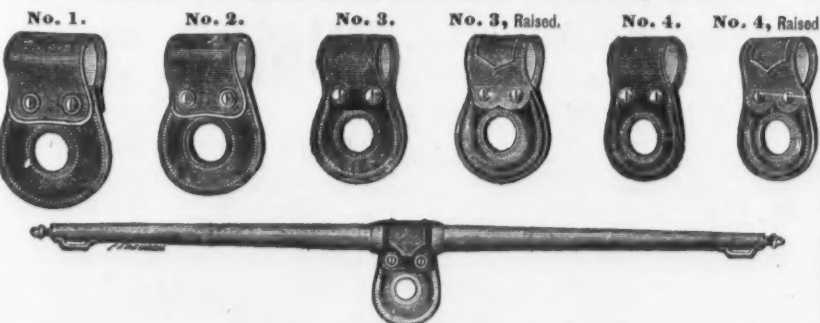
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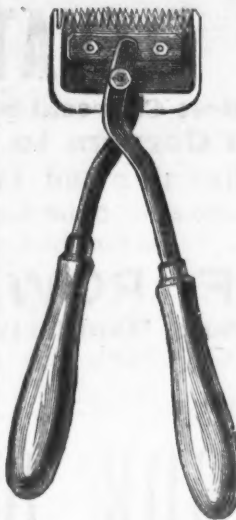
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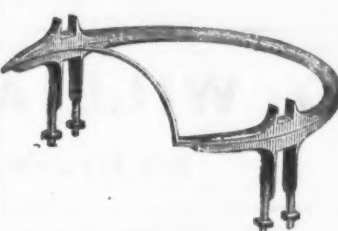
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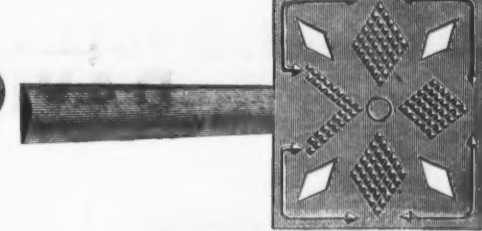
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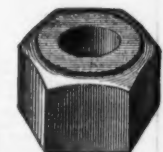
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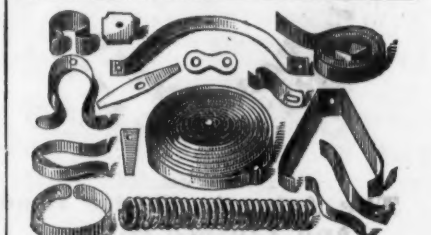
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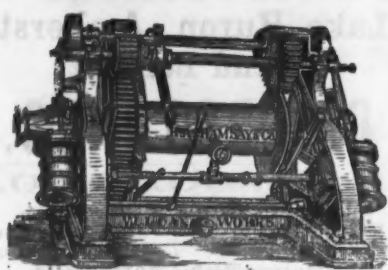


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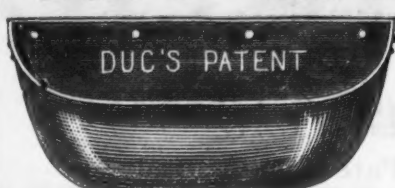
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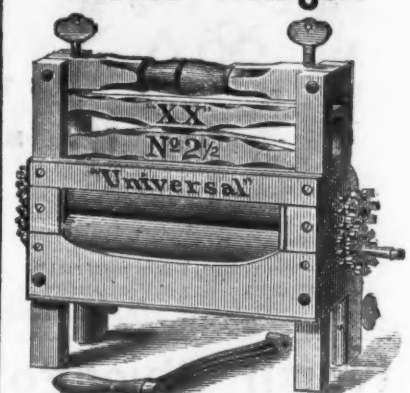
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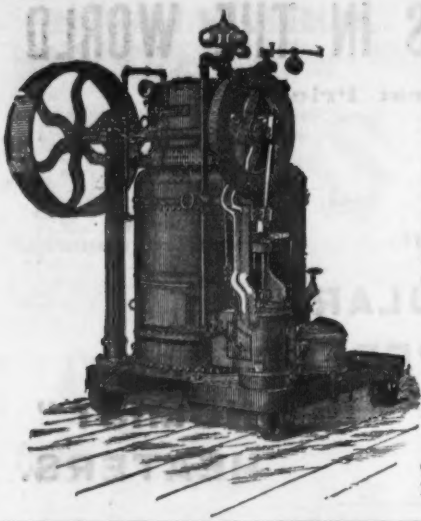
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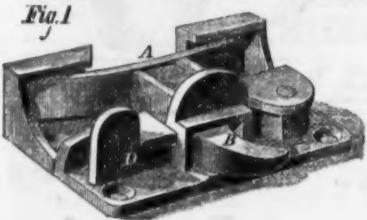
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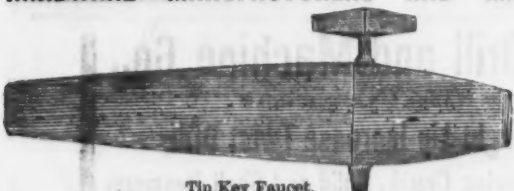


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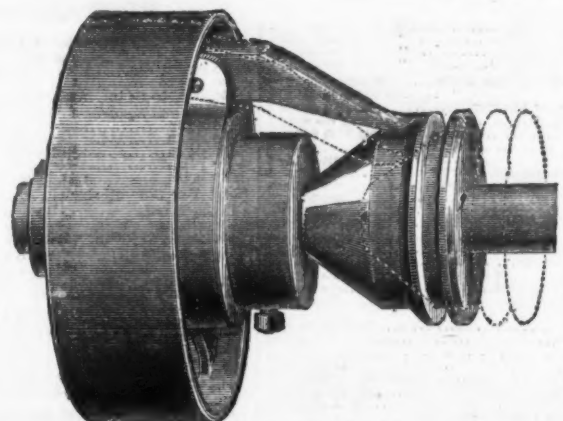
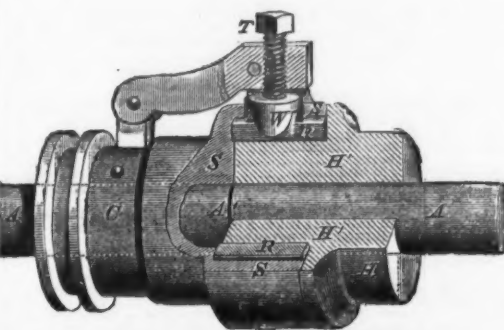
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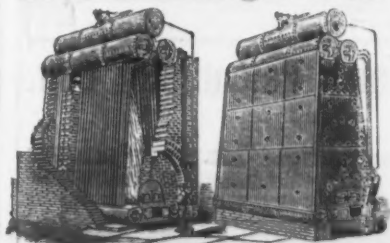
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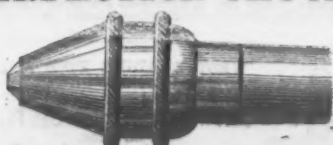
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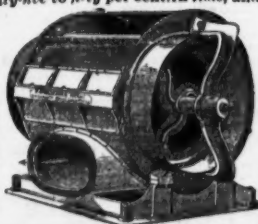
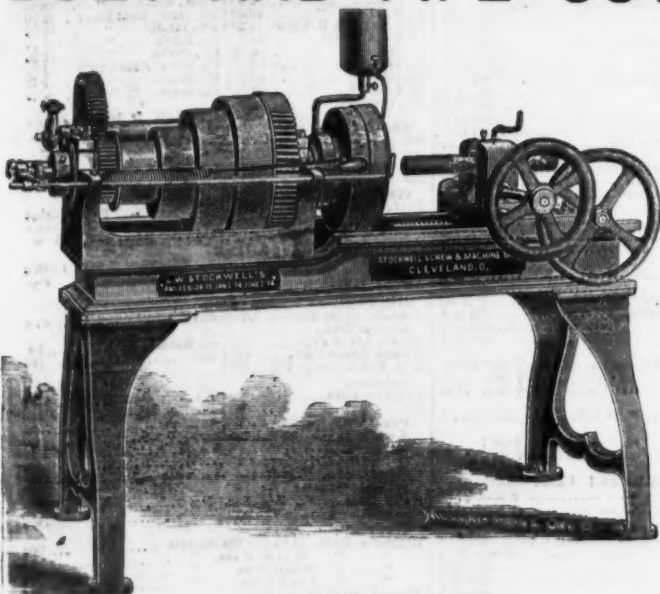
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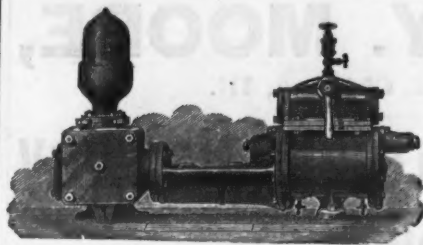
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No. 290 " 574 to 576 " " 2930
No. 291 " 576 to 578 " " 2940
No. 292 " 578 to 580 " " 2950
No. 293 " 580 to 582 " " 2960
No. 294 " 582 to 584 " " 2970
No. 295 " 584 to 586 " " 2980
No. 296 " 586 to 588 " " 2990
No. 297 " 588 to 590 " " 3000
No. 298 " 590 to 592 " " 3010
No. 299 " 592 to 594 " " 3020
No. 300 " 594 to 596 " " 3030
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No. 303 " 600 to 602 " " 3060
No. 304 " 602 to 604 " " 3070
No. 305 " 604 to 606 " " 3080
No. 306 " 606 to 608 " " 3090
No. 307 " 608 to 610 " " 3100
No. 308 " 610 to 612 " " 3110
No. 309 " 612 to 614 " " 3120
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No. 313 " 620 to 622 " " 3160
No. 314 " 622 to 624 " " 3170
No. 315 " 624 to 626 " " 3180
No. 316 " 626 to 628 " " 3190
No. 317 " 628 to 630 " " 3200
No. 318 " 630 to 632 " " 3210
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No. 320 " 634 to 636 " " 3230
No. 321 " 636 to 638 " " 3240
No. 322 " 638 to 640 " " 3250
No. 323 " 640 to 642 " " 3260
No. 324 " 642 to 644 " " 3270
No. 325 " 644 to 646 " " 3280
No. 326 " 646 to 648 " " 3290
No. 327 " 648 to 650 " " 3300
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No. 337 " 668 to 670 " " 3400
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No. 344 " 682 to 684 " " 3470
No. 345 " 684 to 686 " " 3480
No. 346 " 686 to 688 " " 3490
No. 347 " 688 to 690 " " 3500
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No. 349 " 692 to 694 " " 3520
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No. 354 " 702 to 704 " " 3570
No. 355 " 704 to 706 " " 3580
No. 356 " 706 to 708 " " 3590
No. 357 " 708 to 710 " " 3600
No. 358 " 710 to 712 " " 3610
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No. 360 " 714 to 716 " " 3630
No. 361 " 716 to 718 " " 3640
No. 362 " 718 to 720 " " 3650
No. 363 " 720 to 722 " " 3660
No. 364 " 722 to 724 " " 3670
No. 365 " 724 to 726 " " 3680
No. 366 " 726 to 728 " " 3690
No. 367 " 728 to 730 " " 3700
No. 368 " 730 to 732 " " 3710
No. 369 " 732 to 734 " " 3720
No. 370 " 734 to 736 " " 3730
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No. 374 " 742 to 744 " " 3770
No. 375 " 744 to 746 " " 3780
No. 376 " 746 to 748 " " 3790
No. 377 " 748 to 750 " " 3800
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No. 383 " 760 to 762 " " 3860
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No. 385 " 764 to 766 " " 3880
No. 386 " 766 to 768 " " 3890
No. 387 " 768 to 770 " " 3900
No. 388 " 770 to 772 " " 3910
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No. 395 " 784 to 786 " " 3980
No. 396 " 786 to 788 " " 3990
No. 397 " 788 to 790 " " 4000
No. 398 " 790 to 792 " " 4010
No. 399 " 792 to 794 " " 4020
No. 400 " 794 to 796 " " 4030
No. 401 " 796 to 798 " " 4040
No. 402 " 798 to 800 " " 4050
No. 403 " 800 to 802 " " 4060
No. 404 " 802 to 804 " " 4070
No. 405 " 804 to 806 " " 4080
No. 406 " 806 to 808 " " 4090
No. 407 " 808 to 810 " " 4100
No. 408 " 810 to 812 " " 4110
No. 409 " 812 to 814 " " 4120
No. 410 " 814 to 816 " " 4130

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| 2 | 27.00 | 31.00 | 2.75 | 7.50 |
| 2 1/2 | 32.00 | 37.00 | 3.25 | 9.00 |
| 3 | 36.00 | 41.00 | 3.50 | 11.00 |
| 3 1/2 | 40.00 | 46.00 | 3.75 | 13.00 |
| 4 | 45.00 | 52.00 | 4.25 | 14.00 |
| 4 1/2 | 52.00 | 60.00 | 4.50 | 17.00 |
| 5 | 54.00 | 63.00 | 5.00 | 21.00 |
| 5 1/2 | 64.00 | 74.00 | 5.50 | 25.00 |
| 6 | 74.00 | 84.00 | 6.00 | 31.00 |
| 6 1/2 | 84.00 | 95.00 | 6.50 | 37.00 |
| 7 | 97.00 | 109.00 | 7.00 | 48.00 |
| 7 1/2 | 112.00 | 125.00 | 7.50 | 50.00 |
| 8 | 132.00 | 146.00 | 8.00 | 60.00 |
| 8 1/2 | 160.00 | 176.00 | 9.00 | 60.00 |
| 9 | 180.00 | 198.00 | 10.00 | 75.00 |
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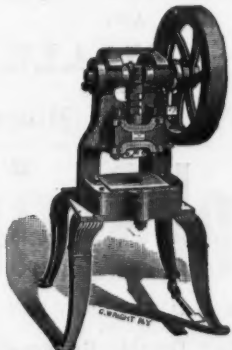
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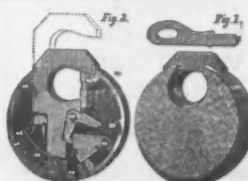
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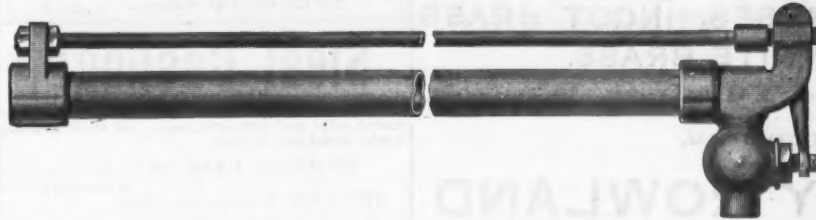
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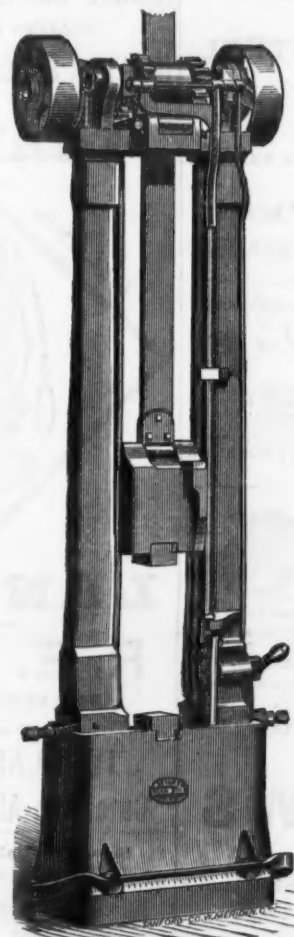
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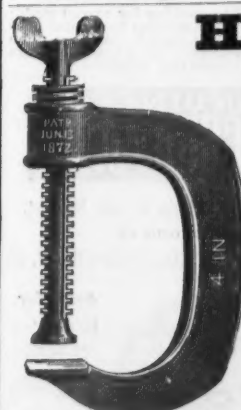
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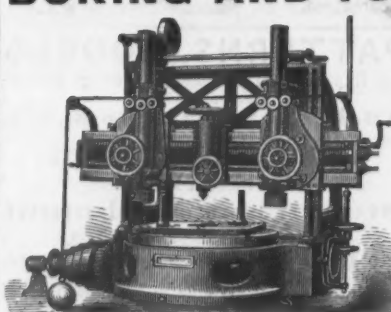
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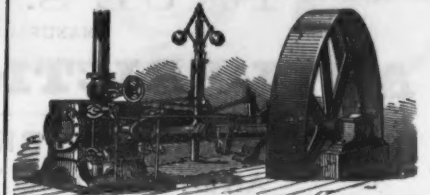
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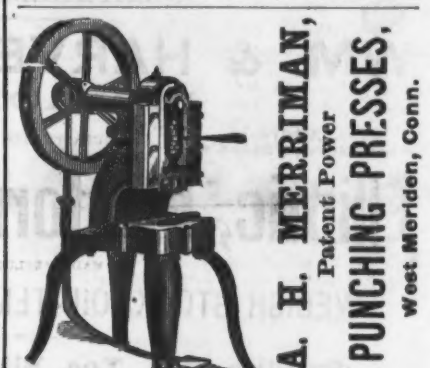


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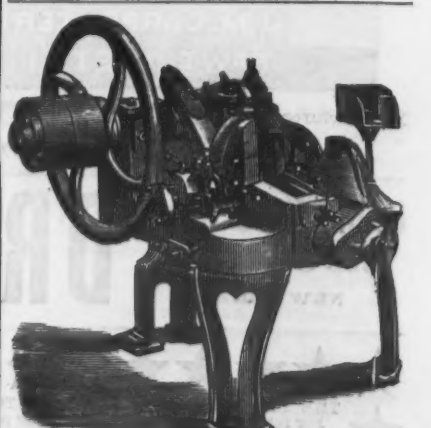
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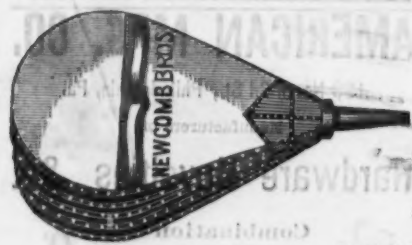
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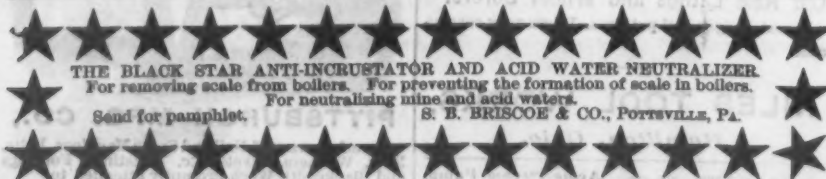
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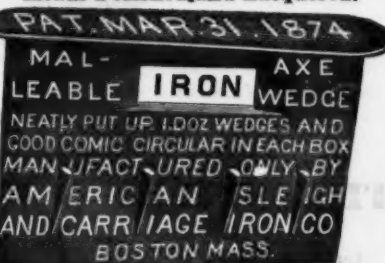
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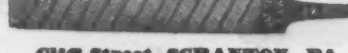
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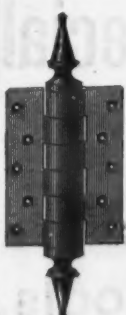
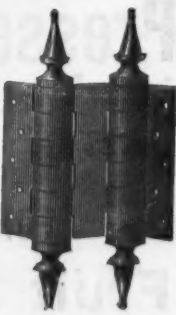
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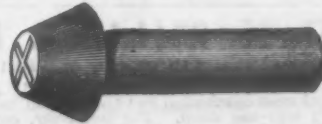
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